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Volume 25 April, 1935 Number 4

Epidemiology of Amebiasis*

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THE epidemiology of amebiasis in these United States has become the source of intense public health interest, particularly in the light of the 1933 Chicago experience. Regarded for many years as a widespread endemic tropical disease, one of the chief obstacles to colonization, and a cause of invalidism to public servants in the tropics, recent years have demonstrated that it is by no means limited to those regions, nor is it the problem it once was in these areas. Any comprehensive systematization of the points published by numerous investigators of the Chicago outbreak of 1933, leaves no doubt of the significant endemicity of this disease in America, and of the fact that public health authorities have a most formidable opponent especially in our older cities or those with large foreign populations of certain types.

Any casual study of the Chicago data brings up most forcibly the attention that must be paid to plumbing with its ubiquitous cross-connections. Previous experiences with this problem in typhoid fever outbreaks have not entirely accomplished the desired results. Furthermore, the clinician must realize that amebiasis manifests itself in a much broader and more comprehensive picture than is generally allotted to it. Waiting for bloody mucous stools to appear before making a diagnosis and instituting treatment may be responsible for the increasing mortality, since such stools may occur only after considerable damage is done.

Since the discovery of *Entameba histolytica* by Loesch in 1875, autochthonous cases have occurred in various countries and continents. On the Pacific Coast, workers have long agreed that this type of infection is not so rare as is generally supposed, but the reasons for the discordance between frequency of amebic infection and recognition of the disease symptom complex has been a matter of conjecture. Certainly, water or uncooked foods can transmit the disease only when contaminated with fecal matter containing resistant encysted entameba. Epidemiologically, the source of these must be latent cases or carriers. It is accepted that cysts may be passed in large numbers in the stools of carriers, and therefore these probably constitute the

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most important source of infection. Theoretically, amebiasis is at least a preventable disease, but it is not always practicable or convenient to take into the gastrointestinal tract only substances sterilized by heat.

It is theoretically desirable that all carriers of *Entameba histolytica* undergo treatment, but this may not prove feasible on a large scale, mainly because of the expense involved and particularly because many carriers, despite the technical thoroughness of the examination, may remain undiscovered. With the discovery of the carrier state, the treatment of carriers and their elimination from duties involving the handling of foods served raw, of equal importance is the proper disposal of excreta, since infection is spread through the transference of cysts from the feces to foods and their subsequent ingestion. Evidence has been adduced that cysts may remain viable in fecal matter for 1 week, and that they live longer in the formed than in the liquid stool. Intestinal zoöparasitism in the presence of improper sewage disposal, as cross-connections or siphonage returns from the sewage to water systems, may lead to infections by bizarre methods. Among these may be listed: allowing cyst contaminated water to enter the mouth while bathing, or to enter the rectum as in the use of enemata, or through washing with polluted water the raw vegetables used in salads.

As most modern water systems carry some residual chlorine the work of Bercovitz [1] on the viability of cysts becomes of decided importance. This author worked on the hypothesis that the use of septic tanks in China would solve the problem of the use of human feces as fertilizers, provided the treatment could be modified or supplemented by chemical disinfectants in order to destroy the cysts of intestinal parasites. The cysts were destroyed by 1 per cent solutions of bichloride of mercury or formalin and by half strength brine after exposure for a maximum period of 1 hour, but not by 1 per cent solutions of acetic acid, chlorinated lime and sodium hydroxide, or by 70 per cent alcohol. The use of hematoxylin stains after treatment was found of more value than eosin in determining the viability of cysts.

The recent work of Spector [2] and her associates indicates very definitely that the *E. histolytica* cysts are removed completely from water by coagulation and filtration through rapid sand filter beds, and that the amount of chlorine required to kill cysts is much more than could be used in a public water supply. The viability of the cysts in water is therefore of importance. Walker [3] and his coworkers kept cysts moist as long as 10 days at tropical temperatures and parasitization subsequently occurred. Darling kept cysts in sterile tap water for 3 days; they degenerated or disappeared and parasitization did not occur in kittens. Schaudinn parasitized kittens with cysts air dried for 6 weeks, but not with those dried for 7 weeks. Dobell [4] concluded that under artificial (cultural) conditions free ameba of *E. histolytica* may survive room temperature up to 3 days, but at 37° C., may survive for at least 5 weeks. The cysts, however, can remain alive at room temperature for at least 37 days, but usually die within a few days if kept at body temperature.

Presumably water, air, certain temperatures, and the secretions of the stomach provide adverse environmental conditions for the cysts and they will perish if they do not gain access to the human bowel. All cysts do not possess the same viability. The cysts present in carriers' stools may be extraordinarily numerous, a daily output having been estimated to be as high as 3 million, which would permit even microscopic particles to carry the infection. Epidemiologically, the disseminating agents

are food handlers, who carry the infection to food and drink by means of the soiled hands and clothing, transmitting cysts from the toilet to washstand, bathtub, laundry tub, and towel. The cycle would be ideally completed in the presence of cross-connections permitting siphonage between the sewage and the water systems, or by gravity flow through a submerged water supply to a plumbing fixture. Apparently this did occur in the more or less closely associated community which existed in certain hotels in Chicago. The reported absence of other enteric diseases ordinarily associated with water-borne outbreaks involving contamination by sewage, is, however, contrary to epidemiologic expectations. An observation by Musgrave indicated that cold temperatures stimulate the parasite to form cysts more rapidly, and this presumably could occur in the water supplies of hotels, particularly if they are refrigerated. This observation may have to be qualified since he may have been dealing with ameba other than *E. histolytica*.

O'Connor and Weynon, in their work in Egypt, found the largest number of carriers of *E. histolytica* among food handlers and prisoners. The soil under certain conditions may be considered a natural habitat and these authors' findings may be explained on the basis of gross soil pollution and insanitary conditions in the institutions. Vegetables from contaminated soil offer an easy means of dissemination, but this should not occur in the United States.

The cyst carrier offers the greatest problem. It is perfectly true that continuous exposure to carriers occurs quite often without infections, at least without clinical manifestations of infection, and these occasions offer epidemiologic difficulties. For example, a freighter ship recently sailed from Manila in which there were two carriers of *E. histolytica* in the kitchen personnel. To the crew of 40, there were enroute approximately 9,000 exposures, but in only 1 instance was amebic infection demonstrable; and indeed there is some evidence that this infection may have been acquired ashore.

In this connection, Walker's [3] classical experiments in Manila, in which *E. histolytica* was fed to human beings, are of more than passing interest. Of 20 men who ingested *E. histolytica*, 17 became parasitized following the first feeding, and 1 required 3 successive feedings, although all had been prepared with magnasium oxide as a neutralizing agent against the acidity of the gastric secretion. It is doubtful if parasitization would have occurred had they not been so treated. The lapse of time from ingestion of infectious material to the appearance of entameba in stools varied from 1 to 44 days, with an average of 9 days. Of great importance is the fact that of the 18 men experimentally parasitized, only 4 developed dysentery and these were infected with cysts from healthy carriers. The incubation periods were 20, 57, 87, and 95 days. This latency is characteristic of the disease, and such latent infections may follow adjuvant causes, such as fatigue, alcoholic excesses, chilling, etc., but may be entirely due to the chronicity of the ulcerative process. Walker concludes that the chief, if not the exclusive, sources of infection lie in the chronic latent cases or carriers, because of their relative prevalence. Added difficulties arise in the facts that the condition exists indefinitely, the parasitization is unsuspected for years, and the carriers shed continuously or intermittently enormous numbers of cysts.

Kessel [5] stated that the parasite may at times live in the lumen of the intestine in commensalism and under certain conditions may become a tissue invader; also that it is significant to remember that the entameba living in

the lumen which have ingested bacteria only, when transferred to kittens are invasive and produce dysentery. Moreover, the so-called "small" races of *E. histolytica* produce as severe infections and as extensive pathology as the "large" races, and are therefore probably just as pathogenic. The resistance of the host appears to be a more important factor in the production of clinical amebiasis than the alleged differences in virulence. Higgins asserts that repeated passages increased the virulence but that the accompanying bacteria also played a rôle in the acceleration of the virulence, at least for the production of liver abscesses.

Walker's feeding experiments on human beings were obviously reproduced on a large scale in certain Chicago hotels. Under these conditions, persons returning to their homes throughout the United States were parasitized following their residence in these hotels. It may be significant that no similar outbreak occurred elsewhere and that the epidemiologic problems involved in the spread of the disease and in parasitization were therefore peculiar to Chicago. Perhaps also these conditions were even more limited, being confined to a small area within the city proper. Furthermore, the number of infections in proportion to the number of exposed must have been small, especially when compared to other enteric diseases, or amebiasis is less easily transmitted. The latter hypothesis is probably the deciding numerical infection factor.

Any measurement of the rôle of carriers in the spread of amebic dysentery in a city such as Chicago is unusually difficult. Perhaps, as the epidemiological study and protozoan survey of Williamson, Kaplan, and Geiger,[6] indicates, the data are unreliable because observations and reports by local physicians are incomplete. Significant data show that amebiasis is by no means restricted to prescribed geographic endemic areas. The disease is evidently indigenous to the Middle West, as reported by Brown,[7] who concludes that "the wide distribution of *Entameba histolytica* must be appreciated by physicians and public health authorities." The problem is inseparably connected with the introduction of large numbers of immigrants from areas in which high parasitic indices obtain. The Chicago data of 1929 are especially interesting in that the carriers discovered were handling food in large hotels, and 64 per cent of them were foreign born. The physician should regard obscure cases of intestinal disease with suspicion and look for the etiological possibility of *E. histolytica*. The health officer has a great responsibility in that he must recognize this problem and initiate appropriate measures for the control of this menace. When such important work as the search for carriers has once begun, no break in its continuity should be permitted.

The importance of this statement is shown in the more recent Chicago experience. The monthly average number of reported cases of amebic dysentery for the City of Chicago is approximately 2, and the annual average for the 3 years 1930, 1931, 1932, was 18. The statistical epidemiologic methods used by the Chicago Department of Public Health are not unlike those of the San Francisco Department of Public Health, which permit of immediate knowledge of appreciable changes in the epidemic indices in the various reportable diseases under observation.

From the published data [8] the reporting of cases of amebic dysentery in Chicago in 1933 showed nothing of unusual importance until the month of August. The epidemic index as expressed in per cent, or ratio between the normal expected incidence and the actual reported incidence, suddenly mounted to 650, increased to 700 in September, and went as far as 1,400

in October. The very abruptness of this rise in August could have been considered as a warning of no slight significance and an indication for unstinted diligence in rigorous epidemiologic investigation in an effort to discover the probable source or focus of infection. These and subsequent published data of the health authorities in Chicago are ample evidence of this diligence.

Bishop and Bishop[9] in a study of amebiasis occurring endemically in New York City, concluded that the actual incidence is probably far greater than is commonly supposed, and these authors felt that more attention should be paid to the search for carriers. Faust's[10] data, obtained in protozoan surveys, very definitely indicate the presence of an appreciable amount of *E. histolytica* infection in the population of Wise County, Va., and New Orleans, La. In fact, 4.3 per cent positive specimens were found in 460 persons examined in the former place, and 10 per cent among 172 in the latter.

Reed and his associates,[11] in a protozoan survey of 1,000 prisoners at San Quentin Prison near San Francisco, demonstrated 92 per cent infestation. The San Francisco Department of Public Health in coöperation with Reed, has just completed a survey of food handlers in hotels and clubs in San Francisco. Of the 400 persons examined, 3.7 per cent, or 14, were found to be positive for *E. histolytica*. The records failed to show that any of these were responsible for the infection of the cases reported, although careful epidemiologic investigation into the probable source of infection is always made. Also, it should be pointed out, no cross-connections between the sewage and water systems of these hotels and clubs existed.

Previous protozoan surveys made in the United States by Kofoid and his associates, and by Stiles and Boeck, demonstrated an appreciable amount of parasitism.

The statistical data quoted as a result of observations and protozoan surveys are illuminating but neither conclusive nor exact. The status of the term "amebic dysentery" as to whether reference is made to the carrier state or to a clinical case, is most obscure and perhaps chaotic. Apparently, physicians do not consider the disease as reportable, and even if so, the term "amebic dysentery" is not considered as including the all important carrier state. Obviously, the public health significance of this disease in the United States, with especial reference to the accuracy of statistical summaries of reported incidence, rests with the reports of physicians. That amebiasis is more widespread than once thought or the available reports indicate, should engage the best efforts of the conscientious health officer to determine its real status and danger in the community.

For reliable data, more than one fecal examination in each individual studied is required in every protozoan survey; the same dictum obtains in the clinical diagnosis of the acute case. Furthermore, extreme care must be exercised in the examination of fresh stools and stained specimens for ameba, and full appreciation must be held for the technical knowledge and skill required for recognition of the parasite. In an effort to detect the carrier state, stool specimens from convalescents from amebic dysentery should be examined for *E. histolytica* at frequent and regular intervals. Likewise, the rôle played by the carrier of *E. histolytica*, especially in food handlers in hotels, restaurants, clubs and other public eating establishments still remains an unknown quantity in the epidemiology and spread of the disease in large population centers of the United States, especially where the migration of new immigrants from

known endemic areas is continuous. To these epidemiologic possibilities there has been added through published observations such animal reservoir hosts, as rats, mice, dogs, domestic pigs, and perhaps others, including the monkey. The mechanical transmission by the house fly can be acknowledged but only in areas where the lack of sanitation allows easy accessibility to human feces.

Three matters are of paramount importance, especially in the light of the Chicago experience: (1) the examination of food handlers for the carrier state in amebic dysentery; (2) the probable reason for the localized accelerated virulence; and (3) the administrative problem of proper sewage disposal. Perhaps the carrier state in amebiasis is analogous to what has occurred in the carrier state of other diseases which often has food as its vehicle of infection. The term, "once a carrier, always a carrier," might well have been applied to some of those examined in 1927 in Chicago, and their activities as food handlers forever terminated.

Since the rôle of human carrier has been clearly shown, it would appear that there is ample justification for the search for the carrier state among food handlers as a preventive or control measure. The routine examination of all food handlers presents certain definite difficulties.

The carrier state is frequently intermittent rather than constant. Unless the specimens are obtained under well regulated circumstances, the possibilities of falsification of source are manifestly a possible, and indeed a probable, source of error. The cost of the medical and laboratory examination, if properly carried out to include all possibilities and follow-up, is probably greater than the results of such a search warrant. The expense of setting up a departmental organization, so that the examination may be more nearly uniform and standardized, is considerable, and official agencies cannot easily demand a fee for such service unless the scope of the examination is extended to include the desirable points of the periodic health examination. In the larger population centers, particularly, such a practice would assume proportions approaching certain types of state or social medicine, and such a program should be avoided. On the other hand, the individualism of medical practice could not supply the public health official with uniform interpretation of findings, and the practice of accepting certificates of private practitioners would not afford the desirable uniformity of standard. The inclusion of the private laboratories, with a certain amount of individualism in technic, also complicates the reliability of the data furnished from nonofficial sources and increases the complexity of the entire program.

The laboratory examination, of itself, offers a greater field of usefulness than the medical examination alone. To be of value, however, the specimens should be from bona fide sources, should have been obtained under controlled conditions, and should be delivered at the laboratory as soon as possible, in good condition, properly labelled. If these circumstances obtained, the results of the laboratory work have definite and important significance; if not, the results of the most careful work are subject to criticism and question. The methods used should be standardized to insure uniform technic, but it must be remembered that the procedures of a decade ago are not suited to present-day requirements. It is highly desirable that the laboratory personnel have an inherent desire constantly to improve the laboratory methods, so that full advantage may be taken of the work of others. Elaborate equipment is not demanded by most improvements in technic, but unless the proper mental

attitude is present in the worker, even elaborate equipment is of little value as an incentive.

Whether food handlers on ships, in hotels, clubs and restaurants should be examined as a prerequisite to employment is open to argument. It would seem more rational that physicians report their cases of amebiasis more promptly and that the Department of Public Health, as the official agency, investigate the probable source of infection with diligence and intelligence, and arrange for the immediate removal of the carrier from food handling, with surveillance over his or her future activities.

The acceleration of the virulence of the organism in Chicago in 1933 appears to be a clinical fact. The reason for this, if it is at all possible to assign any, can be argued only from the evidence which has been presented, on the basis of purely clinical findings and on assumed epidemiologic theories. From the clinical standpoint, the severe type of infection, in which there was reported a high frequency of gangrene of the intestine, with the malignant type of dysentery, would indicate a type of amebiasis heretofore unencountered in the United States. Careful analysis of the detailed tabulations of symptoms and signs and laboratory findings in all cases would be more than interesting. Such data are not available.

Theoretically the apparent epidemiologic exaltation of amebiasis in Chicago may have been due to mass infections or to some superimposed virus of an allied or totally unlike disease. In any event, the Chicago experience may be repeated in other localities and this possibility offers a problem of intriguing complexity to the health official. The determination of the number of permanent carriers resulting should prove of intense interest, for it is highly probable that these will materially increase the incidence of amebiasis throughout the United States.

This increase, however, should not reach even near epidemic proportions in any community, provided the lessons learned in Chicago are not forgotten by health authorities. Moreover, it is not inconceivable that the conditions of cross-connections and siphonage between the sewage and water systems as found in certains hotels in Chicago, or by gravity flow through submerged water supplies to plumbing fixtures, can be duplicated in many communities. The existence of such conditions, however, will stand as an everlasting indictment of the non-enforcement of existing plumbing laws, or demonstrate woful lack of the necessary and essential technical sanitary engineering knowledge which is so remarkable in some departments of public health, even today.

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Clinical Amebiasis in Relation to Public Health*

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AVAILABLE evidence indicates that between 6 and 12 million persons in the United States are subjects of amebiasis. Such figures at once raise the amebiasis problem to the dignity of major public health interest. From this standpoint, there must be considered the direct death rate, the incidence and mortality of complications, the direct sickness and disability rate, the depression of physical vigor with its concomitant lowering of social and physical efficiency, and the increased susceptibility to other diseases. Data are insufficient to make any fair quantitative estimate of these various items. That the sum total is large and important, can be safely inferred from consideration of the clinical and pathologic features of amebiasis, and from analogy with other widespread chronic diseases such as hookworm infection and malaria. In this presentation it is our concern to analyze the situation and to deduce the best practical methods of control. Amebiasis is considered strictly as human infestation with *Endameba histolytica*.

CLINICAL AMEBIASIS

E. histolytica must be considered primarily, and perhaps entirely, a tissue parasite. Invasion of the human body takes place solely by ingestion of cysts. In the terminal small intestine, these excyst and release active amebae which tend to invade the mucosa of the colon. Rarely there is invasion of the terminal ileum. Dobell [1] has shown that excystment and encystment can take place in the same surroundings. The first site of election is the cecum. From here the infection may overflow or spread lower in the colon as the amebae are carried along by the colonic flow. They naturally penetrate the mucosa where mechanical conditions favor, as in the flexures, lower sigmoid and rectum.

In the tissue a characteristic pathology is produced by a process of gelatinous necrosis. Callender [2] describes this as follows:

> In both the gland layers and the submucosa the lesions are characterized by the lysis of tissue and the absence of reactive or inflammatory phenomena. . . . While it is possible that the destruction of the mucosa over a considerable area may precede and be the method of formation of the amebic ulcer, the more probable stages in the formation consist in the progression of the amebae to the sub-mucosa along vessels and lymphatics, and the formation of small areas of cytolysis (amebic abscesses), their discharge on to the surface, their involvement in secondary infection by bacteria of the intestinal lumen and the gradual extension of the ulcer partially as a result of a secondary infection but particularly as a result of the peripheral lytic action of the ameba. If the secondary infection is of a mild nature, symptoms may be almost entirely lacking. . . . Destruction of

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a vessel wall by the ameba may lead to a frank hemorrhage, and thus for the first time call attention to the pathological process in the intestine. The principal point needing emphasis is that the amebic lesion is one showing characteristic changes of the activity due to the parasite, cytolysis, and practically no reaction on the part of the tissues until secondary infection occurs when the reactive phenomena are due to that secondary infection and not to the parasite.

The amebic pathology calls attention to 3 clinical points[3]:

(1) The lesion may penetrate deeply in the intestinal wall, even reaching the serosa. This may result in adhesions, deep pockets and granulomatous masses. It also explains the facility with which amebae may reach the lymph and blood capillaries. (2) Sooner or later secondary bacterial infection of amebic lesions takes place. This leads to important clinical considerations, such as production of fever, complications in symptomatology, lack of clinical cure with specific treatment, and residual, often permanent, bowel damage after eradication of amebae. It also affords a portal of entry for systemic bacterial invasion, thus acting as a true focal infection. (3) The host-parasite balance is of the utmost importance. Granting the presence of amebae, the optimum condition for the host is where the amebic colonies are not extending, and where bacterial infection is absent. The optimum for the ameba is where the bowel is not disturbed in its physiology. Diarrhea and dysentery are easily excited if the amebae become more active. Diarrhea results in decrease or absence of cyst formation and in extrusion of active trophozoites which promptly die. Thus clinically diarrhea is associated with presence of active amebae and disappearance of cysts, causing interference with transfer of cysts to a new host.

The writer[4] has divided clinical amebiasis into 7 types, based on the pathology already described, which are classified according to the clinical picture and indications for treatment:

1. Dysentery with acute, malignant onset and course—This requires immediate diagnosis and treatment. Fever and prostration are often present and the frequent bowel movements are attended by severe colic and bleeding.

2. Amebic diarrhea or dysentery with sub-acute onset and course—This is the ordinary type of amebic bowel disturbance. It tends to become chronic or to show irregular exacerbations.

3. Chronic uncomplicated intestinal amebiasis—This includes the so-called "carrier" state, and the condition of recurrent or mildly persistent symptoms. It is the most frequent type in this country. Almost always secondary bacterial infection which requires treatment in itself is present.

4. Extra-intestinal amebiasis, which, for practical purposes, consists chiefly of hepatitis and liver abscess. Abscesses in other organs and ulceration of the skin, especially contiguous to sinuses, are less frequent.

5. Amebiasis complicated by other infections, by systemic diseases, and by surgical conditions—Bacillary dysentery may coexist or the amebic dysentery may mask cancer or colonic tuberculosis. There is reason to believe that amebic lesions may act as true foci of bacterial infection, allowing entry into the circulation of bacteria, bacterial products, and other chemical substances from the large intestine. Surgical complications, including granulomas and abscesses, are not uncommon, especially following the recent Chicago epidemic. Operation in the presence of active, untreated amebiasis is exceedingly dangerous. Proper and safe treatment depends on early diagnosis not later than at the time of surgical intervention in the abdomen. Amebic lesions easily simulate peptic ulcer, cholecystitis, appendicitis, perforation, gangrene and new growth, or they may coexist with such conditions. Operation in the presence of such an untreated amebic lesion is dangerous and may result in fatal perforation or gangrene of the bowel. "It is to be remembered that surgical complications may appear early in a first acute attack, or late in cases insufficiently treated; also that they may be discovered unsuspected at operation, or operated upon without

recognition, or operated upon under a wrong or incomplete diagnosis."

6. Sequelae of amebiasis include various types of chronic colitis, sprue, cancer, chronic infections such as tuberculosis, residual ulcers, and colitis maintained by bacterial infection, and mechanical defects such as stricture and scarring. Effective early treatment is the best preventive for these sequelae.

7. Toxic results of drugs used, must be considered seriously, as all too often an unjustified treatment hazard is added to the disease hazard, as discussed by Anderson.[5] Toxic drug symptoms must be clearly distinguished from the symptoms of amebic disease.

Together these 7 types make up the clinical picture of amebiasis. This comprehensive picture, based on the pathology and natural history of *E. histolytica* makes the incidence of amebiasis strikingly important in its public health aspects.

Diagnosis of amebiasis is fundamentally important for 2 reasons: (1) On it depends efficient treatment and removal from society of a source of amebic infection. (2) It is the only sound basis for accurate reporting and public health control. Diagnosis rests solely on microscopic identification of *E. histolytica* by a competent technician. Comparatively few technicians are competent to make this diagnosis. It is a procedure definitely requiring special training. A wrong diagnosis is more dangerous than none at all. It should be a part of the general public health program to set up a method of accurate diagnosis, available to all practitioners. Such a method has been described by Reed and Johnstone.[6] In brief, a thin fecal smear is made on a slide with a small paste brush, and, with care to avoid drying, is put at once in Schaudinn's solution as a fixative. The slides are then sent to a central laboratory, either in Schaudinn's solution or in 70 per cent alcohol, where the iron hematoxylin staining can be completed and the slide examined. This method has the advantages, (a) of allowing immediate stool examination, thus preserving both cysts and trophozoites; (b) of allowing accurate identification of a fixed preparation; and (c) of affording a permanent slide-record of the diagnosis. The sending of stool specimens by mail is not satisfactory because all motile forms disappear and cysts begin to lose their characteristics after 48 hours.

Treatment of amebiasis has been summarized by Reed.[4] It is only necessary to note carbarsone as the drug of choice, given by mouth, except in acute dysentery, where rectal use gives quicker control. Vioform has also been used orally with excellent results. In amebiasis of the liver, in surgical complications and for control of malignant acute dysentery, emetin remains the drug of choice. Emetin is dangerous and therefore must always be used with circumspection.[1, 7, 8, 9] It should never be given intravenously, and the total dosage by any and all routes of administration must not exceed 10 mg. per kilo. Proper treatment of amebiasis depends on correct and early diagnosis. It is essential for public health control and for the immediate as well as the ultimate health of the patient. Every person harboring *E. histolytica* should be effectively treated. This is even more important in chronic, largely symptom-free cyst passers than in acute dysentery because only cysts transmit the infection. The cyst-passer is a danger both to himself and to his fellows.

INCIDENCE AND EPIDEMIOLOGY

James,[10] in 1928, reviewed surveys of the incidence of amebiasis in England, and in North and South America up to 1927. He concluded that the data, so far as presented by authoritative observers, indicated an incidence of 5 to 10 per cent in the general population,

where amebic dysentery is not endemic, and a higher rate where dysentery is endemic. James's experience in non-dysenteric cases was that trophozoites alone were found, without cysts, in 50 per cent. If the same ratio holds in temperate climates as in Panama, James believes that the actual incidence rate, based on examination for cysts alone, should be doubled. He rightly says that a parasite infecting 5 to 20 per cent of the general population deserves attention. He infers that the pathogenicity of *E. histolytica* in temperate climates is inversely proportional to its relative incidence.

Reference may be made to the surveys reported since James's summary (see Table I).

Differences chiefly in methods, selection of groups, geography, and urbanization make it impossible to construct an exact numerical summary of these data. In general they confirm rather than refute James's estimate of a minimal incidence in North America and Europe of 5 to 10 per cent of the general population. For the United States this means a minimum of 6 to 12 million persons infected. In comparison with other infections and parasitic diseases, amebiasis thus assumes major public health importance.

Study of the figures quoted indicates a probable minimal rate in cities and a maximal rate in rural districts. Combined with the experience of the Chicago epidemic, the conclusion seems justified that the incidence of amebiasis is directly proportional to lack of effective disposal of feces. This is related to higher rural incidence and also to city outbreaks which are due to sanitary defects or breakdowns. This general proposition is modified by the influence of contamination of food supplies by cysts from food handlers, by mechanical transfer by insects or dust, and by contamination of foods eaten raw which have been fertilized with human excreta. These latter methods of infection are results of a personal or individual lapse or breakdown of proper sanitary disposal of feces. We have to consider, then, two major aspects of the public health problem: one concerned with sanitary sewage disposal, both urban and rural; the other with personal hygiene in two particulars—personal cleanliness, especially after defecation, and protection of food and drink from accidental contamination with cysts. The rural problem is much more difficult to control.

It is obvious that every person harboring *E. histolytica* has swallowed human fecal material. For that reason, there is to be expected a correlation between the incidence of other intestinal protozoa, especially *Endameba coli*, and of *E. histolytica*, as has been demonstrated by various workers, in New Orleans by Johns [24] and by Faust,[26] and in Tennessee by Meleney.[25]

Experiment and observation agree that transmission of amebiasis is by cysts alone. It has been taught too generally that cysts are found only in formed stools and motile forms only in the presence of dysentery or diarrhea. That this is not true was proved among others by Reed,[28] who found in a study of 50 cases in San Francisco that 38 had motile amebae, and of these 3, or 8 per cent, had neither diarrhea nor dysentery. Also in the earlier malignant Chicago cases, cysts were not infrequently found in dysenteric stools. It cannot be assumed that invariably there is no danger of transmission from patients with diarrhea or dysentery, nor that the absence of these symptoms makes certain that only cysts will be passed.

Dobell [1] has shown that cysts of *E. histolytica* can remain alive at room temperature at least 37 days, whereas at body temperature they generally die within a few days. Wight and Wight [29]

TABLE I

Author	*Location*	*Type of Examinees*	*Number Examined*	*Number of Examinations*	*Per cent E. histolytica*
Williamson, Kaplan and Geiger [11]	Chicago	Hotel food handlers	1,148	?	2.35
Philiptschenko [12]	Leningrad	Food employees	400	1	22.75
Philiptschenko [12]	Leningrad	O.P.D. non-dysenteric	162	1	25.3
Philiptschenko [12]	Leningrad	Child clinic patients	42	1	9.5
Philiptschenko [13]	Leningrad	Intestinal in-patients	225	(1 in 173 cases)	14.2
Craig [14]	Army Hospital, Washington, D. C. (?)	In-patients	689	1 or 2	11.2 by stool exam.
Andrews and Paulson [15]	Baltimore	O.P.D. gastrointestinal	522	..	0.2 this low rate unexplained
Milam and Meleney [16]	Rural group, Jackson County, Tenn.	75 complete families	374	..	38.0
Bach [17]	N. W. Germany	Excludes intestinal	1,000	..	5.7
Meleney, Bishop, and Leathers [18]	Rural Tennessee, 69 counties	General population	20,237	1	22.8
Johnstone, David, and Reed [19 a]	San Quentin Prison, Calif.	Prisoners, cross section of state, new admissions only	1,000	3 with iron hematoxylin	9.2
Arnett, Wenrich, and Stabler [21]	Philadelphia	Unselected college freshmen	401	1	4.5
Dougherty [22]	Atlanta	Private patients	1,103	..	5.0
Johns and Tripoli [23]	Louisiana	At large	544		7.44
Johns [24]	New Orleans	Private patients	199	cul. & micro.	9.0
		Medical students	181	"	8.3
		Charity Hosp. O.P.D.	234	"	7.26
Meleney [25]	Rural Tennessee	At large	4,987	1	17.3
Faust [26]	Wise County, Va.		460	6	45.4
	New Orleans area		172	6	27.9
Svensson, quoted by Faust [26]	Sweden, 1928	Hospital cases	611	corrected	3.4
	Sweden, 1928	Asylum cases	1,244	to	21.4
	Finland, 1928	Out-patients	159	6	20.0
Riley, quoted by Faust [26]	Minnesota, 1929	Ex-service men	about 500	exams.	1.9
Creswell and Wallace [27]	Tacoma, Wash.	Transient men	358	1 with concentration	11.7
Creswell and Wallace [27]	Tacoma, Wash.	Food handlers	408	"	1.2
Creswell and Wallace [27]	Tacoma, Wash.	Physicians	40	"	2.5
Creswell and Wallace [27]	Tacoma, Wash.	Insane food handlers	100	"	2.0
Creswell and Wallace [27]	Tacoma, Wash.	Private patients	126	"	7.9

[a] These cases were consecutive new admissions to the prison, and therefore not "institutional" cases, in which, as Boeck and Stiles [20] and others have shown, the incidence tends to be higher than in the general population.

have extended Dobell's limit to 46 days. Persistence of viability, however, requires suitable and sufficient moisture. Manson-Bahr [30] states, ". . . as cysts of *E. histolytica* can only survive on a moist medium, there is a considerable amount of evidence, experimental and epidemiological, that amebic infection is mostly water-borne." It is known that the cysts may remain viable in water for at least 2 or 3 weeks, while they are easily killed by desiccation, as stated in 1922 by Dobell and Low.[31] Spector and Buky [32] have shown that when human hands were heavily contaminated with infected fecal material and allowed to dry at room temperature, practically all cysts were dead in 5 minutes, and it was exceptional that any survived beyond 10 minutes. It is evident that contamination of food must occur under conditions of sufficient moisture both on the carrying agent and in the food, to prevent drying of the cysts. This emphasizes the importance of washing and drying the hands invariably and immediately after defecation, and of taking particular care to avoid handling moist or liquid foods without this procedure. It throws light on the relation of humid climate to persistence and spread of amebiasis. From this standpoint, amebic incidence becomes a function of the interrelation between humidity of climate, sufficient local moisture to preserve cysts, character of personal hygiene, public sanitary state, and presence of amebic cyst passers. Personal hygiene in turn becomes a function of the interplay of intelligence and sanitary education. In such a summary, it is evident that the easiest natural conditions for transmission will be afforded by accessibility of water supply to cyst contamination, as happened in Chicago. Under such conditions, building up of carrier reservoirs, increased virulence by faster transmission [33] * and mass infection easily follow and together would seem to explain the epidemiologic and clinical peculiarities of the Chicago outbreak. Here was seen a true epidemic of malignant amebiasis, previously unknown in temperate climates and not fully appreciated in tropical climates. On the other hand, the summary given explains the nearly universal endemic or sporadic occurrence of amebiasis, for it is to be remembered, as Dobell and Low [31] phrase it, that amebiasis seems to exist wherever there are human beings, and that it is probable that its greater prevalence in warm climates is related more to the question of sanitation than of climate.

We have next to consider the relation of the infected food handler to clinical amebiasis. Such a relation rests chiefly on theoretical and epidemiological grounds. Careful and conclusive studies are inadequate so far to show direct contamination of food under practical conditions by the hands of food handlers. The same remarks apply to the question of family infection.

Milam and Meleney [16] report an intensive study of a rural community in Jackson County, Tenn., including 75 families with 374 persons. These people lived mainly on their own crops, lacked sanitary privies, and were under an isolated, pioneer social organization. Thirty-eight per cent carried cysts of *E. histolytica*. The high infection rate can be correlated directly with the social and sanitary offenses present. Meleney [25] carefully surveyed 5 families, comprising 27 individuals of whom

* J. G. Thomson [33] says, "From my experience of this disease, and of all diseases caused by protozoan parasites, I am convinced that the causal organism may vary in its virulence to a very appreciable extent. Further it seems to me that this question of virulence in the case of *E. histolytica* depends to a great extent on the facility and rapidity with which it can pass from host to host. Put shortly, the severity of the disease between the extremes of the acute and the chronic, symptomless, carrier form, is directly related to the frequency with which the individuals in a community are exposed to repeated, intensive and massive infections."

23 were infected with *E. histolytica*. He concluded that the mother was probably the source of spread because she was the chief "food and child handler." He found poor sanitation and hygiene, and low intelligence to be important factors. It would be difficult to say that all amebic patients are of low intelligence but it is certain that a fault in personal hygiene is invariably involved. Where such faults are combined with low intelligence or sanitary ignorance, we see the problem of the infected food handler and housewife assuming major proportions. In all of these situations we come back to the root of the problem in the clinical cyst-passer.

This analysis brings into view two types of clinical control which are potential major public health methods of control: (1) the effective treatment of all amebiasis patients, (2) the perfecting of personal hygiene, including sanitary education, to a point which will reduce the hazard or probability of infection. It is to be remembered that carriers of amebae should be instructed in social hygiene and, in the absence of proper social conformity, should be subjected to restrictive measures, as advised editorially in the June issue of this *Journal*.[34] These restrictive measures should at least apply to food handlers and housewives. The problem of control must not be abandoned because of the difficulties involved.

The problem of animal reservoirs needs further study. Monkeys, pigs, and dogs have been suggested by Kessel[35] as possible hosts of *E. histolytica*. A survey by Frye and Meleney[36] revealed cysts in house-fly droppings and in pigs. Little is known as to the relation to human infection but there is little or no evidence that such transmission occurs or that animal strains are infective for man.

Within the field of epidemiology lies also the question of isolation of patients and carriers. Here common sense agrees with available knowledge, that isolation is inadvisable in either case.[37] Again, personal hygiene and good sanitation are sufficient. Reference must be made to the important and debatable matter of pathogenicity of *E. histolytica*.

We believe that insufficient attention has been accorded to study of predisposition to amebic infection. Craig[42] in numerous articles, has discussed immunity and complement fixation. It would seem that the obverse is equally important. Various workers as McCarrison,[38] and Dunn,[39] have called attention to the rôle of deficient vitamin supply in chronic diarrhea and in amebic dysentery. A similar relation to mineral metabolism has received comment by Cantarow[40] and others. There are sufficient suggestive data to justify a careful, large-scale study, as to the relation between depressed social conditions including unbalanced dietary, and the incidence, and especially the pathogenicity of *E. histolytica*. The bearing on public health is direct and fundamental. Amebiasis may be favored by such factors. In any case, it results in lowering of resistance to other infections and tends to reduce physical and mental vigor. These factors are also related to the extreme chronicity of the amebiasis and its peculiar tendency to exacerbations and relapses. Manson-Bahr[41] states that this may be one of the most persistent of all protozoan infections.

PUBLIC HEALTH CONTROL

It is undoubtedly true, as Milam and Meleney[16] have indicated, that there is little or no correlation between carrier incidence and dysentery incidence, and that amebiasis does not warrant direct special public health measures for its immediate reduction, but this does not at all mean that a definite program should not be formulated for control. Routine examination of all food

handlers for *E. histolytica* is impracticable because of the expense involved, the difficulty of providing sufficient reliable technicians and the uncertainty as to the intrinsic value of the method. Adequate regional surveys of food handlers are much needed in the effort to evaluate the importance of food handlers in spreading amebiasis.

The most important feature of public health control is accurate and complete reporting by physicians of cases of amebiasis. McCoy [37] has stressed this point in detail. It is incongruous, to say the least, that the California State Board of Health requires report of "Amebic Dysentery" only, and not of "Amebiasis." Correct reporting is based on availability, and use by physicians, of proper methods for quick and correct diagnosis. The health officer has then to watch his indices of incidence, and follow up any increase of endemic index with an immediate intensive survey of the local area involved. This method seems fully adequate to control the amebiasis problem from the public health standpoint. Its effectiveness rests entirely on accurate and complete reporting by physicians. This in turn necessitates education of physicians in the nature of clinical amebiasis. Too many physicians are ignorant of the clinical and diagnostic features of amebiasis, and its treatment. Until this condition is corrected, control will continue to be inadequate. The old struggle to develop a sanitary sense in the general public must go along with the education of physicians. A popular demand for clean food, clean dishes and utensils, clean kitchens, clean waiters and other food handlers, safe water supplies, absence of flies and insects where food is handled, clean hands and fingers, and the availability and enforced use of sanitary toilets and washbowls—such a demand would go far to control the amebiasis problem and with it many other related problems.

CONCLUSION

The incidence, direct effects, and indirect results of amebiasis make necessary a definite public health program with reference to it. This program should consist of (1) education of physicians, (2) education of the public, (3) accurate reporting and close watch of endemic indices, (4) provision of diagnostic facilities, and (5) intensive control of infected areas. Such a program easily coördinates with other health policies and programs and is within the practical range of expense.

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Meningitis Quarantine—District of Columbia

ABOUT 1,700 transients were placed under quarantine by health authorities, February 6, because of an outbreak of spinal meningitis, newspapers reported. One death occurred on February 7. About two-thirds of the number were released February 14, but about 300 were still confined because cases had developed in the lodging houses in which they were quartered. All transient lodging houses were quarantined. About 450 men quartered in small hotels under contract were brought back into the lodges, but those living in private homes were not affected by the ban.—*J.A.M.A.*, 104, 10:840 (Mar. 9), 1935.

Laboratory Diagnosis of Amebiasis*

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THE recent widespread discussion of amebiasis in both the medical and lay press has again focussed attention on the everlasting importance of correct and early diagnosis. With bewildering frequency new procedures and interpretations have been recommended and the novice is frequently tempted to overcome his shortcomings by trying every method without really acquiring proficiency in one. It is true that the final medical diagnosis is merely aided by the protozoölogical findings, but in amebiasis the proper identification of the causative organism is of greatest importance. Time and time again such experts as Dobell and James have repeated the axiom: If the microscopic diagnosis of amebiasis cannot be made correctly, then it should not be made at all. Since the diagnosis rests solely upon the microscopic recognition, differentiation, and identification of *Endameba histolytica* in a complex environment, it is obviously essential that those entrusted with the examination shall be competent observers, equipped with special training, technical skill, and experience. The examination for amebae should be confined to certain laboratories staffed with a personnel which can critically study the specimens submitted. Experience and observations during the past 25 years justify the conclusion that the diagnosis of amebiasis is not the function of the average laboratory.

The essential steps required to make a correct diagnosis may be considered under the following headings: (1) Collection, selection and shipment of material for examination; (2) Concentration; (3) Preparation of stool specimens for examination; (4) Microscopic examination of stained preparation; (5) Cultural examination; (6) Pathogenicity tests; and (7) Complement fixation test.

COLLECTION, SELECTION, AND SHIPMENT OF MATERIAL FOR EXAMINATION

For many years the necessity of studying only absolutely fresh stools has been recognized. This essential prerequisite is usually ignored, and the microscopist encounters many additional difficulties which he would not meet in the study of fresh stool material. In old fecal specimens the motile forms disintegrate, the cysts lose their differential characteristics, and coprozoic forms make their appearance. A large percentage of patients with amebiasis, even in the absence of diarrhea, show motile amebae, together with cysts. Reed (1934) points out that it has been the consensus of opinion that outside of the tropical zone amebic dysentery is infrequently found and that motile forms are associated closely with diarrhea or dysentery; and in the absence of diarrhea or dysentery cysts are to be ex-

* Read at a Joint Session of the Laboratory and Epidemiology Section of the American Public Health Association at the Sixty-third Annual Meeting in Pasadena, Calif., September 6, 1934.

pected. However, in a group of 50 patients he found that 36 per cent showed dysentery and 76 per cent motile amebae. He further points out that if 76 per cent of the cases showed motile amebae, and if stool examination had been limited to cold specimens sent to the laboratory in the usual containers on the same or succeeding days, it is certain that in a majority of the series the diagnosis would have been missed. James (1926) stresses the fact that in about one-half of the histolytica infections seen by him only vegetative forms were found. Motile amebae die quickly and immediate fresh examination of stool specimens or immediate fixation of fresh fecal samples should be resorted to. In an old stool one is apt to encounter numerous active protozoa; it is highly probable that they developed in the stool after it was passed. These are the troublesome free-living coprozoic forms which are introduced into the feces by contamination after passage, or gain access to the alimentary canal in the encysted state, from the air or by the intake of food or water. Andrews (1930) lists 6 members of the Sarcodina and 4 of the Mastigophora which may be encountered in an old stool. To obviate the difficulties enumerated, it has been our practice to have the patient produce the specimen on the premises or in the hospital, and the necessary examinations and preparations are made as soon as possible. In cases where the specimen has to be brought from the hospital or home into the laboratory by the patient, clean paraffined cardboard drug-cans are supplied.

The selection of the proper fecal material for examination is most important. If the stool is not homogeneous, smears should be made from both the formed and unformed portions, and especially from those parts containing flakes of mucus or blood. The evacuation should be normal and not induced by purgatives. Castor and mineral oils should be avoided as they complicate the microscopic picture. The more drastic purgatives should likewise be avoided, since liquid stools are unsatisfactory—in fact useless. To obtain a soft stool without purgation James (1926) recommends a mild laxative. Kofoid suggests bile salts or *fel bovis;* Haughwout (1930) a full dose of strychnine sulphate, fluid extract of cascara in very moderate dosage or a laxative dose of Carlsbad water, and Reed and Johnstone (1932) Epsom salts in small amount.

An ideal method used many years ago is now again recommended. (Fradkins 1934)—the collection of suitable specimens with the aid of the sigmoidoscope. The proctoscopic examination exposes the ulcers and with a long handled small curette or a camel's hair brush scrapings may be removed which lend themselves to the preparation of excellent slides at the bedside. At times when amebae were not demonstrable in the stools they were found in specimens taken from the scrapings of ulcers obtained through this instrument. Manson-Bahr and Gregg (1921), in view of the fallacies and shortcomings of microscopic diagnosis, advocate the routine use of the sigmoidoscope. Brown (1926), Abd-el-Azim (1930), Paulson and Andrews (1927), and Reed and Johnstone (1932), have all obtained excellent results by the use of this instrument. Willoughby (1928), supporting the practice of sigmoidoscopy, believes that mere swabbing of a lesion is ineffective and holds that amebae can be more certainly obtained by scraping the lesion with a long-handled curette. This procedure deserves wider application since the specimens can be collected at the convenience of the physician.

The shipment of stools to the laboratory should be discouraged. The methods of James, Kofoid, Reed, and Johnstone, which depend on the preparation of wet smears at the bedside,

enable the physician to mail specimens over long distances. Any physician or health worker can keep on hand the few solutions needed and any public health laboratory can furnish suitable containers. Fecal smears prepared directly from the patient are fixed in Schaudinn's solution, then transferred to alcohol, in which they are shipped to the laboratory. For survey work this method is most effective and time saving. It is needless to emphasize the absolute necessity of repeated stool examinations. The number of amebae, both in the motile and cystic phases, occurring in stools from a patient taken on successive days varies to such an extent that it is almost obligatory to make more than one examination. An excellent rule to make at least 6 examinations before a patient is declared free from intestinal protozoa should be adopted.

Manson-Bahr (1921) believes that if a series of cases be examined once each, about one-third of the infections present would be disclosed. In a series examined 3 times, between one-half and two-thirds of the actual number of infections would be detected. Brown (1926), in a survey of 533 cases, found that the positive findings occurred in 68 per cent of the first, 92 per cent of the second, and 98 per cent of third examinations. By using reasonably fresh material and examining the permanent preparations James (1926) expresses the view that in trained hands the positive findings in amebiasis can be raised on the first examination to 75 per cent. According to his experience the second examination, when the first had been negative, raised the percentage to 90. Recently Andrews (1934), in making a comparison of the occurrence of intestinal protozoa from purged and normally passed stools, found that the examination of single purged stools revealed, conservatively estimated, at least 75 per cent of the protozoan species which would have been ultimately discovered, but it must be emphasized that the data published by Andrews were secured by the simple smear test technic with saline and iodine solution and not by the wet-fixed permanent method.

CONCENTRATION

In many instances, cysts occur in fecal specimens in such small numbers that they are detected with great difficulty, and only following the examination of several stools. In order to obviate this difficulty concentration methods have been devised. Yorke and Adams (1926) perfected a simple technic which requires no special reagents. They suggest, in addition, an alternative method for the concentration and washing of concentrate when the cysts are to be used for starting cultures. A much shorter method has been described by de Rivas (1928). The homogeneous suspension of fecal material in 5 per cent acetic acid is mixed with ether and centrifuged. The cysts, if present, will be found in the sediment at the bottom of the tube. This method cannot be used in cultivation work due to the presence of the reagents.

The use of concentration methods as a regular routine procedure, to the exclusion of the more reliable methods (wet-fixed permanent preparations or cultural), is not recommended. Creswell and Wallace (1934), in 1,032 stool examinations used the method of de Rivas followed by the iodine-eosin stain. They admit that although this efficient concentration method was used, perhaps 10 to 20 per cent of the cases were missed. These concentration methods are too strenuous for the vegetative or motile forms which are either completely destroyed or so distorted that recognition is impossible.

PREPARATION OF STOOL SPECIMENS FOR EXAMINATION

In exceptional instances, and then

only when the examiner is an experienced protozoölogist, should fresh unstained stool preparations be employed. James's conclusions that in fresh material a diagnosis cannot be made except by those with long special training who are thoroughly familiar with the elements of microscopy, is amply verified by others. Even the expert may encounter difficulties in identifying *E. histolytica*. If not selectively stained the cells of the inflammatory exudate may be mistaken for amebae.

For preliminary examinations of fresh smears either Kofoid's (Kofoid *et al.*, 1919) modification of Donaldson's iodine-eosin stain or MacDaniels's (1934) methylene blue-methyl alcohol stain can be used. The latter stain is in many ways superior to the iodine and eosin solutions. The whole preparation can be searched with the low power objective in a very short time as the trophozoites and cysts are easily detected as clear refractile bodies in the dark blue field. Under higher power the details of the nuclear structure in organisms stained by this method are more clearly differentiated than in those stained by iodine-eosin. In routine laboratory examinations much time and labor is saved by discarding all stools which fail to reveal intestinal protozoa in the preliminary stained preparation. A definite diagnosis is made on the permanent preparations which have been made from the stool, showing organisms in the fresh smears.

The method of choice in the laboratory diagnosis of amebiasis remains the preparation of wet-fixed, wet-treated, and hematoxylin stained permanent fecal smears.

Comparatively few laboratories make any attempt to prepare satisfactory permanent preparations for the diagnosis of suspected cases of amebiasis. Why this is so is rather difficult to understand as the necessary technic is no more involved and the labor required no more time-consuming than in many routine staining procedures. The method most commonly used for the preparation of permanent smears is the fixation (hot or cold) of wet smears in Schaudinn's fluid followed by a mordant of iron alum and stained in hematoxylin.*

MICROSCOPIC EXAMINATION OF A STAINED PREPARATION

The microscopic scrutiny of a stained preparation must consider (a) the type of the cellular exudate; (b) the various protozoa which occur in the human intestinal tract, and (c) the plant and animal cells of the food detritus commonly noted in the stools.

The careful examination of the cellular exudate of stools will often prove of invaluable assistance in the diagnosis of amebiasis. In many instances where amebae have not been found on the first examinations the characteristic cellular exudate has indicated their presence, resulting ultimately in the discovery of the organisms. The principle underlying this cytodiagnostic method is stated by Haughwout (1930) as, "The cellular exudate from the bowel is a replica of the histopathology of the condition." The basis for comparison and differentiation of the dysenteries (bacillary, amebic, and balantidial) rests on the fact that the cells of the bowel wall react differently to the attacks of the invading organisms. The methods and questions concerned with the cytology of bowel exudates are fully discussed in the papers by Willmore and Shearman (1918), Anderson (1921), Woodcock (1920), Haughwout (1924 a, b, c, 1930), Haughwout and Callender (1925), and lately by Callender (1934).

The inflammatory exudates often contain leucocytes and macrophages containing red blood corpuscles and showing ameboid movement. If not

* For further information regarding procedure consult the author.

selectively stained these macrophages may be mistaken for amebae even by trained workers. The addition of double iodine solution to fresh preparations, in order to tinge selectively the nuclei of the amebae, is not a reliable procedure. Wet fixation and differential staining is indispensable. It is perhaps true that in cases of active dysentery, the large motile trophozoites are readily recognized, but as is generally the case, especially in survey work for latent infections, the precystic or cystic phases predominate. These latter may readily be confused in fresh preparations with corresponding phases of the other species of amebae often found in the intestinal tract concomitantly with *E. histolytica*. In accepting the observations made on permanent preparations as standards, James (1926) concluded that the percentage of error in the examination of fresh specimens with especial reference to the occurrence of *E. histolytica* was too high for accurate clinical work. In fact, it is often difficult to differentiate the amebae even in permanently stained preparations. The permanent preparation has the additional advantage that it serves as an excellent record which can be filed and produced at will.

As stated, the examination of fecal material for intestinal protozoa is not an easy task and the difficulties encountered are numerous. The examination generally resolves itself into determining not what is *E. histolytica* but what is not *E. histolytica*. This statement appears paradoxical but when one considers the countless numbers of objects of both plant and animal origin encountered in a fecal smear, it is evident that the chances for confusion are manifold. *E. histolytica* is only 1 of the 5 species of amebae living in the human intestinal tract; to mistake it in all of its phases for various phases in the life cycles of the other 4 is a simple matter. The intestinal flagellates often are confusing, *Blastocystis hominis*, intestinal epithelial cells, large macrophages containing red blood corpuscles and polymorphonuclear leucocytes are additional pitfalls encountered. Thomson (1926), and Thomson and Robertson (1929) describe and figure in detail the common pseudoparasites occurring in the feces of man which are so puzzling to the observer. Experience is a paramount prerequisite which will protect the examiner from making improper interpretations and grave errors of diagnosis.

CULTURAL EXAMINATIONS

Many workers have stressed the value of the cultivation of *E. histolytica* in diagnosis. St. John (1926) obtained a higher percentage of positive results by culture than by the direct examination of the feces. Craig and St. John (1927), in a comparative survey of 3 methods of examination on 71 individuals, found that the cultural method gave a higher percentage of positives than did either the direct microscopic examination or the sedimentation test. They did not clearly state however, whether the direct microscopic examination was made from fresh smears or permanently by stained preparations. The culture method is of advantage especially when a large increase in the number of amebae is desired. In order to detect cryptic, occult, or hidden infections referred to by Thomson and Robertson (1929) the culture methods may be recommended.

The preparation of the culture media and the making of the cultures are by no means simple. Many media have been suggested. For ordinary diagnostic work Craig's (1930a) simple normal salt-serum medium is satisfactory, but if the cultures are to be maintained for any length of time a medium such as Locke's-egg-blood (L. E. B.) should be used. Kofoid and McNeil (1932) have pointed out the advantages of this for

the maintenance of various species of intestinal protozoa in culture for long periods. The organisms obtained in the cultures must be carefully studied in wet-fixed smears in order to avoid mistakes in diagnosis. Permanent preparations from culture material are difficult to prepare and in routine diagnostic work time consuming. The sediment removed from the culture tube is mixed with a drop of sterile rabbit or sheep serum or a small amount of stool that has been previously shown to be negative for protozoa. Excellent permanent preparations may thus be secured. It is important to note that in studies on the cultivation of *Endameba gingivalis* from the human mouth, Kofoid and Johnstone (1929) found the morphological characteristics of the oral amebae prepared from cultures and stained in permanent preparations decidedly changed. In view of these and similar experiences it is doubtful if the cultural methods offer many advantages over the simple routine procedure of permanently stained preparations of carefully collected stool specimens.

PATHOGENICITY TESTS

Present-day knowledge concerning the pathogenicity of amebae for such remote hosts as the kitten may be of interest scientifically, but the variable incubation time, and the technical difficulties fail to increase the accuracy over the usual diagnostic procedure. As an aid in distinguishing bizarre protozoölogical findings, the pathogenicity test on carefully controlled monkeys may be considered.

COMPLEMENT-FIXATION TESTS

Mainly due to the studies of Craig it has been demonstrated that specific complement fixing bodies are to be found in the blood serum of individuals infected with *E. histolytica* when alcoholic extracts of cultures of this organism are used as antigens. Craig (1927, 1928a and b, 1929, 1930b, 1933), in a series of contributions, described the technic employed in the test and the practical application of it in the diagnosis of human cases of amebiasis. He used a human hemolytic system, the sera were inactivated at 56° C. for ½ hour, and the antigen was an alcoholic extract of 48 hour old cultures of *E. histolytica* grown on the Boeck-Drbohlav medium. The test was not considered positive unless a 3 or 4 plus reaction was obtained on a 4 plus scale. Craig (1933) concludes, following an analysis of the results of the test in 1,000 individuals that:

1. Normal individuals, or those suffering from other infections or diseases do not give a positive complement-fixation reaction with the prepared antigen unless there is a coincident infection with *E. histolytica*.

2. The specific complement fixing bodies disappear from the blood serum following anti-amebic treatment and the disappearance of *E. histolytica* from the feces.

3. In relapsing cases of amebiasis the complement-fixation test, which has been negative during the interval of apparent freedom from *E. histolytica*, again becomes positive in rare instances even before the parasite is again demonstrable in the feces. Thus, a negative reaction, unless repeatedly so for several weeks does not prove the absence of amebic infection or that anti-amebic treatment has resulted in cure.

4. The time of disappearance of the positive complement-fixation reaction after treatment resulting in the disappearance of *E. histolytica* from the feces varied between 3 and 28 days.

5. Individuals infested with other species of amebae, or with the intestinal flagellates, do not give a positive complement-fixation unless *E. histolytica* is also present.

6. The complement-fixation reaction

occurs in all stages of amebiasis, but the strongest positive results are usually obtained in symptomless "carriers" or in those presenting mild symptoms of infection with *E. histolytica*. In several cases of very acute amebic colitis the reaction has been doubtful or negative, although in most severe cases the reaction has been positive.

7. The test has proved of value in the diagnosis of cases of amebic abscess of the liver unaccompanied by intestinal symptoms; in the diagnosis of apparently healthy "carriers" of *E. histolytica* and of those presenting atypical or mild symptoms of infection; and in the control of anti-amebic treatment.

A survey of the work of Craig as well as the infrequent studies of other confirming observers shows that the complement-fixation test in amebiasis is highly specific and is of value in the diagnosis of amebiasis especially in the hepatic type and other stages of latent infection. However, one must agree with Craig (1933) when he states:

> Where the services of a trained protozoologist are available and it is possible to make repeated microscopic examination of the feces in suspected cases, this test would be of comparatively little help in diagnosis, as I am convinced that every case of intestinal infection with *Endameba histolytica* can be diagnosed by microscopic examinations of the feces, provided repeated examinations are made, if necessary.

The practical application of the complement-fixation test is greatly limited. The preparation of an efficient antigen is difficult as cultures have to be continuously maintained over long periods to supply the necessary material. In addition Craig (1929, 1930b) has pointed out that not all of his extracts possessed antigenic properties. He often obtained inert extracts from the same strain of *E. histolytica* that had previously given, and afterward gave, excellent antigenic extracts although the inert ones were made in the same manner as the active.

SUMMARY

1. The following axiom must be recognized: If the microscopic diagnosis of amebiasis cannot be made correctly it should not be made at all. Since the diagnosis rests solely upon the microscopic recognition, differentiation and identification of *Endameba histolytica* in a complex environment, it is obviously essential that those entrusted with the examinations are competent observers equipped with special training, technical skill, and experience. In fact, it is recommended that the examinations for amebae be confined to certain laboratories properly equipped, and with a personnel which can critically study the specimens submitted. The diagnosis of amebiasis is not the function of the average laboratory.

2. Although the experts have recognized for many years the necessity of studying only absolutely fresh stools, this essential prerequisite is usually ignored. In old stool specimens, the motile forms disintegrate, the cysts lose their differential characteristics, and coprozoic forms make their appearance.

3. Equally important is the selection of the proper fecal material for examination. The evacuations should be normal. If not otherwise obtainable, a mild purgative may be used. Liquid stools are unsatisfactory and useless. It is important that different portions of the stool be selected in the preparation of the smears. This is particularly desirable when stools of variable consistency are submitted for examination.

4. With the aid of the sigmoidoscope, specimens may be secured admirably suited for a search for amebae. The proctoscopic examination exposes the ulcers, and with a long handled small curette or a camel's hair brush scrapings may be removed which lend themselves to the preparation of excellent slides at the bedside. This method deserves wider application.

5. The shipment of stools to the laboratory should be discouraged. The methods of James, Kofoid, Reed, and Johnstone, which depend on the preparation of wet smears at the bedside, enable the physician to mail specimens to the laboratory over long distances. Fecal smears prepared directly from the patient are fixed in Schaudinn's solution, then transferred to alcohol in which they are shipped to the laboratory. For survey work, this method is most effective and time saving.

6. It is needless to emphasize the absolute necessity of repeated stool examinations. At least 6 successive daily examinations should be carried out before a patient is declared free from infection.

7. In exceptional instances, and then only when the examiner is an experienced protozoologist, should fresh unstained stool preparations be employed. The method of choice in the laboratory diagnosis of amebiasis remains the preparation of wet-fixed, wet-treated and hematoxylin stained permanent fecal smears. Selective or differential staining of the wet preparation is most essential. The majority of modern methods have fully taken care of this aspect of the diagnosis.

8. The various concentration methods may be useful in the hands of a skillful worker. They are time consuming, and since they rarely surpass in accuracy the wet-fixed preparations or the cultural methods, they have no place in the regular routine examinations.

9. In order to detect cryptic or hidden infections, the cultural methods may be recommended. The preparation of the culture media and the making of the cultures are by no means simple. The organisms obtained in the cultures must be carefully studied in wet-fixed preparations in order to avoid mistakes in diagnosis. By comparison, it is doubtful if the cultural methods offer many advantages over the simple routine procedure of permanently stained preparations of carefully collected stool specimens.

10. The microscopic scrutiny of a stained preparation must consider—(a) the type of cellular exudate, (b) the various protozoa which occur in the human intestinal tract, and (c) the plant and animal cells of the food detritus commonly noted in stools. Experience is a paramount prerequisite which will protect the examiner from making improper interpretations and grave errors in diagnosis.

11. Present-day knowledge concerning the pathogenicity of amebae for such remote hosts as the kitten may be of interest scientifically but it fails to increase the accuracy of the usual diagnostic procedure. As an aid in distinguishing bizarre protozoölogical findings, the pathogenicity test on monkeys may be considered.

12. The complement-fixation test, although specific and of value in the diagnosis of hepatic amebiasis and various other stages of latent amebic infection, is technically exceedingly difficult. Its use is limited on account of the great variability of the antigenic extracts and other irregularities inherent to the complement-fixation test of protozoan infections. One must agree with Craig, who believes that the fixation test is not needed provided a trained protozoölogist can examine repeatedly properly collected and stained stool specimens.

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ADDENDUM

METHOD FOR STAINING FECAL SMEARS WITH IRON—HEMATOXYLIN

1. Smear is made with a paste brush on a clean flamed slide.

2. Without allowing slide to dry immerse it immediately in the fixing fluid (Schaudinn's).

3. For fixation and staining the following methods should be used:

	Minutes
Schaudinn's fluid heated at 60° ... or overnight at room temperature.	10
70% alcohol tinged to a wine color with a saturated solution of iodine in absolute alcohol or with Lugol's solution	10
70% alcohol	5
50% alcohol	5
35% alcohol	5
Tap water (running)	2
Distilled water—rinse	
2% iron alum—aqueous solution heated to 30°	10
Tap water (running)	10
Distilled water—rinse	
0.5% hematoxylin—aqueous solution heated to 30°	10
Tap water (running)	5
Distilled water—rinse	
Differentiate in 2% iron alum heated to 30°	
Tap water (running)	20
35% alcohol	5
50% alcohol	5
70% alcohol	5
95% alcohol	5
100% alcohol	5
Carbol-xylol	5
Xylol	5

Mount with a thin layer of balsam thinned with xylol for temporary slides or with thicker balsam and cover slip for permanent slides.

Schaudinn's fluid—Two parts of saturated aqueous Hg Cl_2 in normal salt, 1 part 95% alcohol. This is the stock solution and will keep indefinitely. Add 4 c.c. of glacial acetic acid to 96 c.c. of the stock solution on using. This solution should be made up fresh at frequent intervals.

Hematoxylin stain—Hematoxylin must be properly ripened in order to secure satisfactory results. The best method is to prepare a stock solution of 10% hematoxylin in 100% alcohol. This solution should be corked and allowed to stand in the light for 3 months or

more. The stain—a 0.5% solution of hematoxylin in distilled water—is then made by using 1 part of stock solution to 19 parts of water.

Iron-alum—The ferric ammonium sulphate crystals must be clear and purple or lavender. Yellow crystals should not be used. Make a 2% solution in distilled water.

Carbol xylol may be used in the place of absolute alcohol if the absolute becomes contaminated with water; or in handling large numbers of slides it may be used between absolute and pure xylol. (Two washings of toluol may be substituted for the carbo-xylol and xylol.)

Carbol-xylol—Fill wide-mouthed bottle one-third full with clear white crystals of carbolic acid and then fill rest of bottle with xylol. If crystals are yellow or brownish in color the preparation will be discolored.

DISCUSSION OF AMEBIC DYSENTERY PAPERS

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THE frequency of family incidence of amebiasis has engaged the attention of many workers for years. Much may be learned from these "amebic families," as may be illustrated by the study of one such family in Chicago which consisted of 10 members. One daughter had dysentery; the father and another daughter gave a history of recent diarrhea with the occasional passage of blood and mucus. One of the younger sons was found to be losing weight although he complained of no other symptom. On stool examination every member of this family was found to harbor *E. histolytica* cysts and the same sized strain of cyst—about 10 micra—was found in each case. Since we have encountered many amebic families we make it a point invariably to question patients with dysentery regarding the health of the other members, and when suggestive histories are forthcoming, we generally endeavor to examine the other members of the same family. Our object is to prevent the dissemination of infection by these potentially dangerous families. In another respect study of families is desirable when possible, namely, in cases of a patient's relapse after treatment. Since the treatment of amebiasis still leaves much to be desired relapses after any known form of treatment occur in a small percentage of cases. Sometimes however, there is evidence that the apparent failure to cure is more probably due to reinfection from some other member of the family.

It would appear that at last amebiasis is recognized to be a public health menace in this country. Such being the case it is necessary that in at least the laboratories of state health departments recognition of the causative parasite should be possible. Much has been both written and said to leave the impression that the parasite can only be recognized by a few protozoal experts in certain laboratories of this country. While it is true that long and careful training is necessary before a student becomes a competent protozoölogist or helminthologist with a knowledge of the bionomics, methods of transmission, immunity reactions, etc., of parasites, nevertheless the recognition of the various intestinal protozoa and the ova of helminths may be acquired by any competent technician, at any laboratory where there is abundant fresh material, under one of the recognized teachers.

Several laboratories are engaged in teaching such technicians and find that the average laboratory worker can, within 3 weeks to a month, acquire sufficient knowledge in this field to enable him to render valuable service in diagnosis on return to his unit.

Potential Problems of Industrial Hygiene in a Typical Industrial Area*

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REALIZING that the improvement of the general health status of the industrial worker is a public health problem and as such should be one of the functions of a department of public health, the health officials of one of the industrial areas in the United States decided to inaugurate a program of industrial hygiene. These officials also realized that one of the first steps in such a program is to obtain a comprehensive conception of the extent of the problem as it exists today. Such a conception, in the absence of definite industrial morbidity and mortality statistics, may be approximated by a preliminary survey of the industrial establishments of the locality, which should be of a type which would reveal the number of persons employed in the various occupations; the materials, processes and conditions associated with these occupations; and the welfare facilities afforded the workers in the industrial environment; thereby yielding a definite picture of the working conditions.

Fortunately, an opportunity to conduct such an investigation in a comparatively brief period was offered through the agency of the Civil Works Act, whereby it was possible to employ some 40 engineers for this problem. In order to conduct this survey in a standardized manner and under the guidance of experienced personnel, the aid of the Office of Industrial Hygiene and Sanitation of the U. S. Public Health Service was enlisted.

This report deals with the results of this study, and also contains definite recommendations for a program of industrial hygiene for the health department in the area surveyed. It was not possible to evaluate by exact quantitative methods the extent of exposure of workers to various materials and the effect of such exposure on the health of the workers, since this would have required a number of persons trained in industrial hygiene. For this reason, it must be kept in mind, that *the results presented in this report must not be interpreted as indicating in any manner whatsoever that an exposure to an industriel condition or material necessarily implies injury to a workman, but merely indicates the potentialities of the situation.*

METHODS USED IN STUDY

Prior to undertaking the survey, the prospective investigators were given lectures on industrial hygiene in general, and particularly on the technic involved in conducting preliminary surveys. With the aid of 2 simple survey forms investigations were made in 615 plants.

* Read before the Public Health Engineering Section of the American Public Health Association held at the Sixty-third Annual Meeting in Pasadena, Calif., September 4, 1934.

The shorter of the 2 forms dealt with data pertaining to the plant as a whole, and required such information as the kinds of products manufactured, number and types of buildings, and a "yes" or "no" answer to certain questions relating to industrial welfare provisions, and whether or not disability statistics were kept at each plant. The longer form, dealing specifically with each individual workroom, was designed for recording the type of work performed in the room, the lack or presence of certain kinds of sanitary facilities, the presence of potential exposure to accidents, fumes, and gases, other poisons, dusty processes, and the various occupations and activities of each occupation. These forms were so worded that the investigator had to use his own judgment very little, most of the data being supplied by the plant management, since it was realized that even with the short instruction course given the men, they were still inexperienced in industrial hygiene methods. In view of the uniform manner in which the data were collected, it is felt that the information, as far as it goes, represents the actual state of affairs existing in the various plants at the time this survey was conducted.

The work of each investigator was checked daily and the results were immediately coded on forms prepared for this purpose. At the end of the field study, which consumed about 7 weeks, the coded results were tabulated in the field for statistical analysis.

RESULTS OF SURVEY

Table I shows the number of male and female workers employed in the various plants at the time this study was made. For the sake of simplicity, the different plants are grouped into 10 main industries. Of 28,686 workers covered in this survey, 22,610 (78.8 per cent) were males. The survey covered roughly about one-third of the persons working in all the manufacturing and mechanical industries in the area, giving an adequate sample of the industrial population under consideration. The industries are arranged in the order of the number of plants found in each industrial group, which in all but one case (the leather industry) also meant in the order of the number of persons employed. By far the greatest number of plants and persons were found in the metal products industry, which accounted for 41 per cent of the plants and 48.7 per cent of the workers.

The percentage distribution of the plants according to the number of employees shows that nearly half (48.7 per cent) of the plants employed less than 10 workers, while 10.2 per cent had 100 or more. The leather products industry, mostly shoe factories, contained the greatest number of plants with 100 or more workers (34.8 per cent). In a few instances, the number of employees totalled close to 1,000; such large plants were frequently found in the metal products industry. At first thought, one would be inclined to conclude that this study included too many small plants, that is, those employing but few workers. However, an examination of the data obtained by the U. S. Census of Manufacturers,* shows that the so-called "small plant" predominates in our manufacturing industries. The percentage distribution for 210,959 manufacturing plants included in the 1929 Census shows an even larger percentage of plants with less than 10 workers than found in the present survey; in the United States, 55.0 per cent as contrasted with 48.7 per cent in the area surveyed. On the whole, the distribution for the plants studied compares very favorably with the manufacturing plants in the United States, indicating that the establishments surveyed were quite representative from the standpoint of numerical size.

* Personal communication.

TABLE I

NUMBER OF PLANTS AND WORKERS IN MANUFACTURING AND MECHANICAL INDUSTRIES SURVEYED

Industry	*Number of Plants*	*Number of Workers*		
		Total	*Male*	*Female*
Metal products industries	252	13,955	12,805	1,150
Printing and allied industries	108	2,308	1,884	424
Chemical industry	99	1,793	1,483	310
Clay, glass and stone	53	1,372	1.370	2
Leather industry	46	8,031	4,469	3,562
Dyeing and cleaning	29	925	310	615
Electroplating	18	89	88	1
Storage battery	5	16	16	0
Rubber goods	3	54	44	10
Fur preparation	2	143	141	2
Totals	615	28,686	22,610	6,076

INDUSTRIAL WELFARE PROVISIONS

Many public health workers and industrialists will concede that a program for the prevention of accidents and disease among the industrial population is a most rational plan. In fact, it is now well understood that the fostering of such programs for minimizing the hazards incidental to employment, is in reality a far-seeing economy. Such programs rightfully come under the heading of industrial welfare, an activity which contributes both to the social and industrial progress of any community. In view of the far-reaching and favorable influence which such activities have been known to exert in the industrial picture, it was deemed necessary to obtain some information on the extent of the industrial welfare provisions in the plants under consideration.

The information on such provisions as safety supervision, medical and nursing facilities, sick benefit associations and disability statistics, disclosed some very interesting facts. Only 5 per cent of the plants and about 20 per cent of the workers were provided with the services of either a part- or full-time safety director and most of these supervisors were found in the plants with 100 or more employees. The medical and nursing care was found to have about the same status as the safety work. Seventeen per cent of the workers had a part-time medical supervisor and only 15.3 per cent had the services of a full-time physician. Full-time nursing service was found to be present for 34.1 per cent of the employees, with practically no part-time nursing service. The only type of disability statistics existing to a great degree in the plants under study, was that of accident records, the keeping of which is compulsory by the provisions of the State Compensation Act. Sickness records were kept for 40 per cent of the population studied, most of such records existing in establishments having sick benefit associations.

In an attempt to determine the influence of the small plant on the data relative to the industrial welfare provisions, Table II was constructed. This table shows the percentage of plants and employees having certain welfare facilities, in establishments employing 100 or more workers as contrasted with similar data for plants with less than 100. (It was found that 89.8 per cent of the plants had less than 100 workers.)

It is apparent that for practically all the listed industrial welfare facilities discussed, the larger plants had a greater percentage of workers furnished

TABLE II

INDUSTRIAL WELFARE SERVICE IN PLANTS WITH 100 OR MORE EMPLOYEES AS COMPARED WITH PLANTS HAVING LESS THAN 100 PERSONS

	Per Cent of Plants and Employees with Listed Service			
	Per Cent of Plants		*Per Cent of Employees*	
Kind of Service	*100 or More*	*Less than 100*	*100 or More*	*Less than 100*
Safety Organizations:				
Safety Director:				
Part-time	25.4	2.7	28.1	6.4
Full-time	29.9	2.2	32.4	6.0
Shop Committees	44.5	6.5	42.2	16.0
Other	73.0	81.6	66.4	86.4
Medical Provisions:				
First Aid Room	53.8	4.9	66.0	12.6
Plant Physician:				
Part-time	19.0	1.4	23.1	5.4
Full-time	11.1	0.2	22.7	0.1
Plant Nurse:				
Part-time	3.2	0.4	5.3	2.0
Full-time	31.7	0.2	50.5	0.3
Disability Statistics:				
Sick Benefit Association	38.1	3.4	39.4	8.9
Sickness Records	49.2	13.3	49.4	20.7
Accident Records	100.0	78.6	100.0	93.9

with such provisions; however, even some of these larger plants were somewhat lacking in medical and nursing service, safety directors, and disability records. It is superfluous to comment at length on the data in Table II, since the information speaks for itself. However, it is desired to point out that in this area, as well as in the United States as a whole, about half of the plants employ less than 10 persons, and 90 per cent less than 100 workers. It is the so-called small plant, therefore, that is predominant, and as this survey has revealed, it is this size plant which was lacking in those welfare provisions which play a vital rôle in any constructive program of industrial hygiene. For this reason, and others that will be developed later, a program of industrial hygiene carried on by a department of health—one that will reach the small as well as the large plant—will be a means of furnishing the services now needed in industrial establishments.

SANITARY PROVISIONS

Although insanitary conditions may not necessarily be associated with ill health, it has long been recognized that the elimination of sources of uncleanliness in factories is conducive to the general well-being and efficiency of the workers. For this reason, an attempt has been made to appraise the sanitary facilities of the industries studied by recording the various provisions of a sanitary nature.

In spite of the voluminous writings disseminated on the dangers of spreading disease by the use of the common drinking cup and the common towel, 19.5 per cent of the workers were using the common drinking cup and 13.0 per cent the common towel. In the printing, electroplating, clay, glass and stone, and dyeing and cleaning establishments, about half of the workers were using a common cup, and in some of these same industries the common towel was also tolerated.

POTENTIAL ACCIDENT HAZARDS

An analysis of the data on accident hazards showed that unguarded moving machinery was the most common potential source of injury, 41 per cent of the workers being exposed to this type of risk. Floor hazards ranked next, with 13.2 per cent exposures, while 7.5 per cent of the workers were not protected against the possibility of eye injuries from flying particles.

Our investigation did not allow for an analysis of accidents experienced in the various industries, so that it is not possible to draw any definite conclusions from the data, except to point out that additional precautions should be taken by the officials to eliminate some of the potential sources of accidents disclosed. That such exposures may at times lead to actual injuries is illustrated by the data in Table III, which shows the percentage distribution of compensated cases by specific causes in certain industries in the State of New York for 1931,[2] as compared with corresponding percentages based on potential accident hazards revealed in the present survey. Only industries and causes common in both surveys were compared, so that it was necessary to omit some material from both studies. It is obvious that a striking relationship exists between the percentage distribution of potential accident hazards and compensated cases for nearly all the causes shown in Table III.

In concluding this portion of the study, one additional table is presented on the possible benefits which may be derived from a closer supervision of safety work. Table IV shows the number and percentage of workers exposed to unguarded moving machinery in plants having either a part-time or full-time safety director, and compares these data with the findings for plants not having such safety supervision. It is apparent that in 4 of the largest industries under consideration (embracing 88 per cent of the total population studied), the percentage of workers exposed to this type of potential hazard was in practically every instance much higher in the plants not having a safety director than in those plants provided with one.

OCCUPATIONAL EXPOSURE TO SPECIFIED MATERIALS AND CONDITIONS

It is well known that numerous materials and conditions incidental to industrial processes are causative factors in the production of occupational diseases. Dublin and Vane,[3] list some 94 groups of industrial poisons in the United States, associated with about 900 different occupations. In view of the influence these materials and conditions may have on the health workers, one

TABLE III

PERCENTAGE DISTRIBUTION OF COMPENSATED CASES BY SPECIFIC CAUSES IN CERTAIN INDUSTRIES IN THE STATE OF NEW YORK FOR 1931, AS COMPARED WITH CORRESPONDING PERCENTAGES BASED ON POTENTIAL ACCIDENT HAZARDS DISCLOSED IN PRESENT SURVEY OF SIMILAR INDUSTRIES

Industry	*Unguarded Machinery*		*Floor Hazards*		*Falls to Different Level*		*Electric Shock, Burns, Explosions*		*Corrosive Burns*	
	Compens.	*Potential*	*Compens.*	*Potential*	*Compens.*	*Potential*	*Compens.*	*Potential*	*Compens.*	*Potential*
Totals	47.7	57.1	24.6	17.5	10.1	3.4	10.4	15.9	7.2	6.1
Metal products	50.7	55.6	22.2	19.2	9.0	1.4	12.8	18.7	5.3	5.1
Printing	55.2	60.2	27.1	10.9	10.0	1.4	4.4	17.2	3.3	10.3
Chemical products	19.6	41.8	24.7	20.3	18.6	4.6	15.5	12.6	21.6	20.7
Clay, glass, etc.	36.9	35.5	35.4	18.1	13.3	1.7	6.7	39.8	7.7	4.9
Leather products	49.4	69.9	27.5	15.6	8.6	10.2	5.0	3.1	9.5	1.2

TABLE IV

NUMBER AND PERCENTAGE OF WORKERS EXPOSED TO UNGUARDED MACHINERY IN PLANTS HAVING SAFETY DIRECTORS AS COMPARED WITH PLANTS NOT SO PROVIDED *

Industry	Number of Workers		Per Cent Exposed	
	With Safety Director	Without Safety Director	With Safety Director	Without Safety Director
Totals	12,701	12,450	29.0	52.7
Metal products	6,744	7,211	36.3	54.2
Chemical products	670	1,123	30.9	39.0
Clay, glass and stone	537	835	26.4	23.9
Leather products	4,750	3,281	18.7	61.5

* Plants having part-time or full-time safety director are compared with those not having such personnel

of the most important tasks undertaken in the present inquiry was the recording of raw materials, processes and finished products associated with each occupation encountered in the 615 plants under consideration. Some 50 varieties of materials and conditions were encountered, of which 11 may be placed in the category of a minor exposure, since experience has shown that no cases of systemic poisoning have ever been associated with the handling of these 11 materials. It should be pointed out again, that the *data on occupational exposure to these materials and conditions, must not be interpreted as signifying that the workers were being subjected to toxic amounts of hazardous materials, for no quantitative studies of the workroom environments were made. The data merely indicate the potentialities present in the plants studied.*

Space does not permit a detailed discussion of the results of the occupational exposure to materials and conditions disclosed in this survey. However, an idea of the extent of the problem is afforded by the results shown in Table V, which gives the number and percentage of exposures (not workers,

TABLE V

NUMBER AND PERCENTAGE OF EXPOSURES TO SOME OF THE IMPORTANT MATERIALS DISCLOSED IN SURVEY

Materials	Number of Exposures	Per Cent of Exposures
Inorganic Non-metallic Dusts:	7,862	27.4
Emery Dust	*3,678*	*12.8*
Quartz Dusts	*2,585*	*9.0*
Carborundum Dust	*793*	*2.8*
Other Silicates	*403*	*1.4*
Talc Dust	*204*	*0.7*
Asbestos Dust	*199*	*0.7*
Carbon monoxide	5,538	19.3
Lead compounds	2,926	10.2
Benzol	1,544	5.4
Turpentine	1,124	3.9
Benzine	995	3.5
Methanol	881	3.1
Aniline compounds	863	3.0
Cyanides	561	2.0
Ammonia	477	1.7

since a worker was exposed at times to more than one material) to some of the important materials found. Inorganic, non-metallic dusts, of which there were 6 varieties, had the largest number of exposures, 7,862 (27.4 per cent). Carbon monoxide came next, with 19.3 per cent of the workers exposed, while lead compounds accounted for 10.2 per cent of the total exposures. The other materials and their corresponding figures are listed in this table. It is evident that from the viewpoint of the kind of materials offering possibilities for future study, inorganic non-metallic dusts of the type listed, carbon monoxide and lead compounds are the ones associated with the greatest percentage of exposures (57 per cent). The problem as to materials and number of exposures is certainly indicated quite clearly in Table V.

In order to form an idea of the entire problem concerning the handling of various materials in the plants covered by this survey, the data in Table VI were prepared in a manner to show the number and per cent of contacts in the 5 major industries, using only those materials in which the exposures were 10 per cent or more. It is quite clear that in the metal products industry dusts of the types listed in Table V, carbon monoxide, and lead compounds constitute the major potential problems; in the printing industry lead compounds, carbon monoxide, aniline compounds, and benzine are of importance from the standpoint of the population covered; whereas in the chemical plants the list includes dusts, lead compounds, aniline compounds, turpentine, manganese compounds, and benzine. In the clay, glass and stone industry only one substance stands out—dust, while in the leather products industry benzol is apparently the only material of importance from the viewpoint of the number of exposures. It is apparent that dust is still one of the most important materials of industrial hygienic significance, with carbon monoxide, and lead compounds closely following. It is of signal importance to point out that, at least so far as the remainder of the United States is concerned, the largest number of cases of occupational poisoning have been due to these same materials. It

TABLE VI

MATERIALS IN THE FIVE MAJOR INDUSTRIES IN WHICH THERE WERE 10 PER CENT OR MORE EXPOSURES

Industry	*Materials*	*Per Cent of Exposures*	*Number of Exposures*
Metal Products	Inorganic, non-metallic dusts	43.6	6,088
	Carbon monoxide	27.5	3,842
	Lead compounds	11.1	1,548
Printing	Lead compounds	37.7	871
	Carbon monoxide	28.6	660
	Aniline compounds	15.5	358
	Benzine	11.5	266
Chemical Products	Inorganic, non-metallic dusts	34.1	612
	Lead compounds	20.9	374
	Aniline compounds	14.4	258
	Turpentine	14.0	251
	Manganese compounds	11.3	202
	Benzine	10.4	187
Clay, Glass and Stone	Inorganic, non-metallic dusts	44.3	608
Leather Products	Benzol	13.1	1,053

is the feeling of the writers of this report that the problem confronting the health officials and industrialists of this area is made manifest by the results of this study.

RECOMMENDATIONS

The preliminary survey of the industrial establishments reported indicates that a large part of the industrial population surveyed is handling materials, and is associated with processes and conditions of manufacture which, if not properly controlled, may lead to injury and ill health of the workers. It is the feeling of public health workers that the improvement of the general health status of the industrial worker is as much of a public health problem as the control of communicable diseases, or any other phase of preventive medicine. As a result of the numerous studies conducted on the health of industrial workers by the U. S. Public Health Service, as well as other agencies, it is established that morbidity and mortality rates are higher for the industrial than the general population, and that certain occupations are of first importance as factors in the causation of excessive sickness and mortality rates.

That the general health of the worker in industry is affected by the materials, processes, and conditions incidental to employment, aside from what we already know of the rôle played by specific occupational diseases, is interestingly presented by Dublin.[4] In evaluating the effects of the industrial environment on the well-being of a large number of workers in a mortality study among 3¼ million white, male wage earners, he found that the mortality rates for the industrial workers were from one and one-half to more than double those for the non-industrial workers. In terms of life expectancy the industrial worker at age 20 had an expectation of life of 42 years as compared to 49 years for the 20 year old non-industrial workers, or a decrease of 7 years. It is Dublin's feeling that although heredity and innate differences play some part, probably the most important factors are the conditions incidental to industrial employment, such as toxic gases, dusts, specific occupational poisons, extreme temperature variations, and many other industrial hazards.

When one considers the size of the industrial population of the region covered in this study, and the results of this survey on a representative sample of the industrial population, in which the potentialities of occupational hazards are clearly brought out, the possibilities of the situation are quite evident, and certainly merit the attention of the local health department.

We know the effect on the human body of various communicable diseases, such as typhoid, smallpox, diphtheria, etc., and take the necessary measures to control them. The effect on health of certain toxic materials used in industry is also known, and it would seem logical to take appropriate measures for the control of these occupational diseases. We know about some of the toxic materials and processes which may affect health. For example, it is known that exposure to more than 20 million particles of granite dust (35 per cent quartz) per cu. ft. of air will in time cause silicosis of a disabling type, usually followed by tuberculosis[5]; that the breathing of more than 1.5 mg. of lead per 10 cu. m. of air, in the form found in lead storage battery plants, will in time lead to serious types of plumbism.[6] In short, if these various materials and processes are not controlled, they will affect the health of the individuals exposed to them, and in the case of a disease such as tuberculosis, others in the community may be affected.

It may be said that occupational disease problems should and could be

solved by industry itself. It is the feeling of students of this problem that such a procedure is no more feasible than the attempt of an individual to control communicable diseases in his own home, or industry the pollution of streams. Industrial hygiene is now recognized as a major public health function, affecting directly the health of a large population and indirectly the well-being and economic status of the entire community. The fact that industry will benefit by the control of occupational diseases, should be considered as merely incidental. No industry is large enough to employ the personnel and facilities necessary for industrial hygiene work, and one must not lose sight of the fact that in the present case, as well as in the country in general, the largest percentage of the industrial population is employed in small plants (nearly 50 per cent of the plants studied employed less than 10 persons), and the greatest need is for these small plants which are incapable of dealing with their problems individually. A health department, with its commissioner, epidemiologist, public health nurse, sanitary engineer, bacteriologist, chemist, laboratory technicians, etc., all in one compact unit, is the only practical body equipped to conduct work of a preventive nature in industry.

The practice of industrial hygiene (control of occupational diseases) falls largely within the province of two types of workers, the physician and the engineer. It is within the sphere of the physician to diagnose occupational diseases and primarily to recognize the existence of those diseases due to the factory environment. Based on the findings of the physician, the engineer is in a position to learn where control measures should be initiated. The engineer's work consists of studying the local plant conditions which have been shown to be detrimental to health, and evaluating the various methods which may be designed for controlling the hazards. It is impossible to tell by a mere inspection of a workroom whether toxic materials are present in the air in such quantities as to constitute a hazard, and whether the protection afforded is adequate. Precise quantitative measurements are needed. Once these measurements have been made, the engineer is able to determine definitely the extent of the hazard and the necessary remedial measures.

In order to carry out a constructive program of industrial hygiene the minimum requirements are:

(A) A physician thoroughly trained in public health procedure and one having a comprehensive knowledge of the effects upon health of the various materials and processes used in industry; in other words, one trained in industrial hygiene.

(B) An engineer who is also trained in industrial hygiene and who is familiar with industrial processes. He should know the following subjects from both a theoretical and practical viewpoint:

1. Microscopy
2. Gas chemistry
3. Mechanics of ventilation
4. Physiology of ventilation
5. Industrial sanitation
6. Illumination
7. Industrial hygiene survey methods

(C) A completely equipped laboratory for carrying on studies in industry. With such personnel and facilities, the following program could be inaugurated:

1. Reporting of all occupational diseases to the division carrying on industrial hygiene work. This will definitely establish where and to what extent certain occupational diseases are occurring, and to suggest corrective measures.

2. In order to acquaint industry, the medical profession, and others interested in such a program, it may be necessary that the personnel carry on an

educational campaign, designed to instruct and interest the various groups involved, as to the importance of the problem, in an effort to further the program. It has been the experience of health departments that the best way to conduct work in industrial hygiene is to coöperate fully with industry, conducting studies in plants, as a rule, only upon request of industry. At the completion of such studies a confidential report on the results should be presented to the plant officials, with recommendations for the improvement of conditions, if such information is necessary and available. All this should be made very clear to the individuals concerned, in order to obtain the coöperation and aid necessary for such work.

3. Studies of the workroom environment and the health of workers by the industrial hygiene personnel as outlined in *2*.

4. In order to carry on this work with the minimum amount of friction and in a spirit of coöperation, it may be necessary to provide a law or regulation which specifically states that the results of any investigation made by the health department can in no way be used in litigation, either by the employer or by the employee. The need for such a ruling is obvious if the interests of all concerned are to be served justly. Attention is called to the Act under which the Bureau of Occupational Diseases of the Connecticut State Department of Health functions, as well as to the excellent work this Bureau is accomplishing in the control of occupational diseases in that state.[7]

The additional cost for maintaining industrial hygiene personnel of the number and type given would not exceed $10,000 a year, or slightly more than 1 cent per capita in the present case. When one realizes the fact that one case of silicosis often costs more than the $10,000 needed for a preventive program of the type outlined, the financial phase of the problem should certainly not preclude the establishment of such a vital adjunct of a health department in a large industrial center.

In closing, it is well to emphasize one important point: namely, that occupational diseases are in a large measure preventable, and the degree of prevention exercised by a community will be reflected in the general health status of that community.

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The City Health Officer Looks at Diphtheria Prevention*

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MORE than a decade has now been spent in many communities in organizing and improving campaign measures aimed toward the ultimate local eradication of diphtheria. Although a health officer may learn much of value in studying the procedures in use in various other parts of the country, each one must eventually work out a machinery of his own, based upon and deeply rooted in local circumstances. By these I mean the community inheritance of relationships between the health department and such groups as the medical profession or other official or nonofficial health agencies, as well as the inheritance in statutory responsibility placed directly upon the local health department itself.

A diphtheria prevention program organized to meet the conditions existing in Baltimore might go on the rocks in a mid-western or western city and *vice versa*. Of course this does not mean that there are not many procedures and methods which will work successfully, wherever applied.

In Baltimore the City Code of Ordinances, in specifying the duties of the Commissioner of Health (there is no Board of Health in our city), includes the statement:

> It shall be his duty . . . to make diligent inquiry into all cases of malignant, infectious or contagious diseases which may occur, and cause immediate measures to be taken to arrest their progress. . . .

Similar responsibility is placed upon boards of health in many localities, as for instance in one of our larger cities where the Charter specifies that the Board of Health—

> . . . shall, so far as is possible, prevent and suppress the spread of infectious and contagious diseases

and in another city where the Charter provisions require the Board of Health—

> . . . to use all reasonable means for ascertaining the existence and cause of diseases of peril to life and health and for averting the same.

To my mind, with such definitely fixed legal responsibility as exists in our city, the health officer and the health department should never abdicate or turn over to any other person or group the mechanics of such a program as diphtheria prevention but, with the least expense on his budget, should organize his antidiphtheria fighting forces with only one thought in view, namely, what methods will most rapidly result in the practical eradication of diphtheria from the community, or in other words, what methods will most rapidly achieve the protection of the greatest number of children at about the age of 6 months.

Quite properly, primary attention is needed in securing as far as is possible, the whole-hearted support of the local medical profession in a civic diphtheria

* Read at a Special Session on Diphtheria Immunization of the American Public Health Association at the Sixty-third Annual Meeting in Pasadena, Calif., September 4, 1934.

prevention campaign. As a rule, the medical profession expects or should expect leadership in health promotion from the health department; on the other hand, no health officer should fail to indicate to the medical profession that the health department cannot do its job along modern lines without the active support of the local medical fraternity. The health officer needs this positive support and has the right to expect it and to receive it. None the less, he must also earn it by indicating an appreciation of the problems facing the medical profession and by showing an earnest desire to serve the profession in a firm but friendly way. It is my experience that slight modifications of inherited and sometimes troublesome health department procedures often play a tremendous part in winning the coöperative support of physicians. It was our good fortune, in 1932, to have the following resolution adopted unanimously by the Baltimore City Medical Society on the recommendation of its own Committee on Public Health and Relations:

> The Committee on Public Health and Relations after a full discussion of the problem, diphtheria immunization, believes that the best interests of the community could and would be better subserved by the Baltimore City Medical Society requesting the Health Department to put on a campaign on diphtheria immunization and that the physicians of the city coöperate with the Health Department to that end. Also wherever individuals or families, because of their impaired circumstances, are unable to pay for the service that the Health Department be asked to render the necessary immunization gratis.

Similar resolutions were adopted at the same time by the three other medical societies in the city.

The machinery for community diphtheria prevention, like all other public health work and human relationships in general, requires a pretty ample supply of what I like to refer to as "oil and grease," which must be applied at the right time and in the right places, if success is to be achieved.

I have noticed that diphtheria prevention efforts may languish for lack of adequate financial support. I do not think a health department can undertake an antidiphtheria campaign in any adequate manner if special funds are not set aside for this particular work. An immunization program merely added to routine health department activities is often unfruitful. We have been fortunate in having during recent years from $1,000 to $1,400 a year for our annual diphtheria prevention campaign. This is in addition to a considerable sum spent on toxoid which, of course, should be supplied by the Bureau of Laboratories without cost for use in private medical practice.

It has been helpful to focus the major community attention on diphtheria on May Day, or Child Health Day, although this year the opening of the fourth annual campaign has been postponed until October 1, because of the presence of a widespread city measles outbreak during April and May. The campaign does best, however, if it is continued throughout the year, and it has been our custom to begin with the New Year an effort "to skim off the cream" of the diphtheria prevention practice and steer it into the offices of the private practitioners. Our publicity for the first 4 months each year places the main emphasis on securing one dose alum precipitated toxoid inoculation for all children at the age of 6 months, or as soon thereafter as possible, and from the family physician. Public clinics are open throughout the entire year, however, and with the city-wide publicity campaign launched by a proclamation from the Mayor on May 1, the Health Department, with its medical and public health nursing forces, conceive it to be their duty to "mop up," so to speak, in the clinics every possible child that has not been inoculated

by that time. In describing our campaign efforts, including the focus on steering diphtheria prevention work into doctors' offices, before a luncheon club made up largely of lawyers and business men, I was struck not long ago by the comment of a lawyer who said his profession would be fortunate in having some governmental agency doing as much for them.

Of course the newspapers probably are the greatest single help in the publicity, although the radio and a minute-and-a-half talkie trailer shown in the motion picture houses throughout the city are among the other most valuable adjuncts.

This movie talkie trailer, created by our Health Department with the aid of volunteer guild actors was seen during May, 1933, by an estimated audience of about one-half the city population. It is based on a special 6 months personal greeting card, which is sent by the Health Commissioner to about 35 Baltimore babies each day throughout the year, and every year, on the day they reach the age of 6 months. Promptly following its mailing there is a follow-up visit by a public health nurse. The card has on it the picture of a child of about the right age, and the message is one wishing the baby the best of health and happiness and urging particularly that the parents protect the child by toxoid inoculation without delay. The assistance of the Public Health Committee of the City Medical Society was sought in the wording of this important message, which reaches practically all of the 14,000 babies born each year in our city. Among other things the message states

> We hope your parents will plan *now* to protect you against diphtheria.
>
> Surely, if you could talk you would ask them to do this for you. Maybe the next time you cry your Mother or Father will understand that you are begging for their help and will take you to a doctor who will give you the safe and harmless toxoid inoculations, or refer you to one of the Health Department clinics.

The movie talkie trailer, which is entitled "An Ounce of Prevention," depicts the postman leaving the message at Mrs. Kelly's doorstep, addressed to the Kelly baby, who is 6 months old on that day. Two more scenes indicate Mr. and Mrs. Kelly going into a huddle over the matter and Mrs. Kelly then taking the baby to Dr. Brown for toxoid inoculation.

Just this year, in May, we adopted 1 c.c. of alum precipitated toxoid as the standard immunizing agent for our city and we expect that a larger number of children will be protected because only one dose is necessary. In former years with two-dose toxoid about 12 per cent of the children receiving the first dose failed to return for the second one. This change from the two-dose toxoid was made after a local research study and in consultation with the authorities at the U. S. Public Health Service.

With us the entire community focus on diphtheria prevention is set at the age of 6 months "or as soon thereafter as possible." It has always appeared to me that if a health department states merely that the preschool age is the desirable period for inoculation, without saying anything more definite, the average parent will procrastinate until the child is nearly ready to go to school, and much valuable time will thereby be lost. The constant reiteration of 6 months as the desirable age has, I believe, resulted in an earlier average inoculation age in our community than would otherwise have been the case.

The selection of 6 months as the age of choice for toxoid immediately brings into focus the fact that the Schick test, except for occasional sampling of the child population, is of no practical administrative value in a program aimed at the younger preschool children. It is for this reason that I am

constantly amazed at the reluctance with which some administrative health officers approach the decision of throwing the Schick test overboard as a health department procedure. The *Appraisal Form* may in part have been responsible for this. I know that a few of my scientific friends are saddened by this feeling I have, which is quite a strong one, that the health department's job is to expend all its energy on getting more and more 6 months old babies inoculated. With the dramatic reduction in diphtheria in recent years following widespread immunization, the question of exactly what percentage of inoculated children may or may not be Schick positive after varying intervals of time should be a matter of only academic interest to a health department. It may possibly be that 10 years from now we will be sorry that we have not done Schicks on the thousands of children inoculated in Baltimore, but I am extremely doubtful of it and believe that the Schick test is a time consuming and expensive interference in a clear-cut city diphtheria prevention campaign where the age group focused upon is made up of 6 months old children.

By periodic letters to the medical profession twice a year, by the use of business reply cards for reporting children inoculated, which are sent out with these letters and are also distributed with the toxoid from the Bureau of Laboratories, the Health Department has been fortunate in receiving an increasing number of reports of diphtheria prevention work in private practice. In 1932 the ratio of protected children reported by medical practitioners as compared with those inoculated at the clinics was 1 to 16; whereas in 1933 there had been a relative increase in the work done and reported by physicians, so that the ratio then stood as 1 to 6. For the first 7 months of 1934 the ratio has been 1 to 4. Of course the 1934 campaign, opening in October, will probably alter this last ratio somewhat.

The Parent - Teacher Associations throughout our city have organized diphtheria prevention committees and home visiting groups and have been of the utmost assistance in persuading parents, during the active part of the campaign, to have their children protected. Similar work has been carried on by our well organized Negro civic groups. The school authorities likewise have been most coöperative, and many industrial concerns have placed in their pay envelopes special pink health department slips urging the toxoid inoculation of children in the families of the employed groups in industry. During the 1932 campaign these same slips were also sent out with each telephone bill in the residential areas during the month of May. Many collateral forms of publicity have been helpful, including out-door posters, placards inside and outside of trolley cars, displays in conspicuous downtown store windows, and articles in a score or more of special local periodicals, including the foreign language press. The new poster in use this year was drawn by a high school girl in a city-wide school art class competition.

The message the year around and emphasized particularly during the month of May is shown opposite.

It is difficult to appraise the exact results of an effort of this kind but we have set for ourselves the goal A Year Without a Death from Diphtheria in a city of over 800,000 population. The case and death rates have come tumbling down in recent years with these active diphtheria prevention campaigns. In 1930, 17 per cent of our preschool population had been reported as inoculated; in 1932, the percentage was 24; and in 1933, it was 31 per cent. In 1930 there were 20 diphtheria deaths in our city, which was the lowest figure on record at that time. In 1932,

PARENTS! TOXOID PREVENTS DIPHTHERIA

SEE YOUR PHYSICIAN

OR

VISIT A DIPHTHERIA PREVENTION CLINIC

PROTECT YOUR CHILDREN AT THE AGE OF SIX MONTHS, OR AS SOON THEREAFTER AS POSSIBLE

there were 15 deaths, and in 1933 there were only 6 deaths; whereas so far this year we have already had 5 deaths. The diphtheria death rate for the year 1933 was 0.7 per 100,000 population. There may be years when the rates will go up a bit, but if our continuing efforts are adequate there should never be a return to the conditions of the pretoxoid era.

Diphtheria Immunization Record

THE largest number of diphtheria immunizations in any year since 1929, 185,586,was reported by Dr. John L. Rice, Health Commissioner (New York City), for the year 1934. Of the number of children immunized 117,569, or 64 per cent, were under 6 years old. In 1929, when the Diphtheria Prevention Commission began its intensive drive, 211,985 children were immunized. Since this commission ceased to function in 1931, the work has been carried on by the Health Department without outside funds. In 1932 there were 166,-243 immunizations; in 1933 there were 161,611.

Deaths in the 3 year period 1932–1934 fell to an average of 133 per year, contrasted with 750 when the demonstration was begun in 1929.—*Medical News* (New York City), *J.A.M.A.*, Mar. 2, 1935, p. 757.

Diphtheria Immunization by One Injection*

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A STUDY was made of the time required for development of immunity and the degree and frequency of reactions which follow the use of toxoid.

The various preparations of toxoid administered intramuscularly to a large group of Schick positive children were:

1. New York City toxoid, 8½ units per 1 c.c.
2. New York City toxoid, 8½ units per 1 c.c. to which 0.2 per cent alum was added
3. Michigan toxoid, 7½ units per 1 c.c.
4. Alabama alum precipitated toxoid, 10 units per 1 c.c.
5. Michigan alum precipitated toxoid, 20 units per 1 c.c.
6. New York City alum precipitated toxoid, 42 units per 1 c.c.

Results obtained with two injections were described previously,[1] but are presented briefly for comparison.

In a group of 359 children, two 1 c.c. injections of 8½ units of toxoid produced 93 per cent immunity at the end of 12 months. In a group of 337 children, two 1 c.c. injections of a similar preparation, modified by the addition of 0.2 per cent of alum, produced 95 per cent immunity in the same period, and showed a more rapid development of immunity during the first few months.

In a group of 229 children, two 1 c.c. injections of concentrated toxoid of 30 units per c.c. produced 86 per cent immunity at the end of 12 months. Reactions following the use of this preparation were 3 times more frequent than from toxoid of lower potency. The results obtained with alum precipitated toxoid were determined by re-Schicking at the end of 6 months those children found to be positive at the end of 6 weeks.

Another group of 173 children were given the Schick test 6 months following administration of one injection of alum precipitated toxoid from 3 laboratories; the percentage of Schick negatives was slightly lower than those obtained at the end of 6 weeks, the figures being: Alabama 66 per cent, Michigan 69 per cent and New York 71 per cent.

Although a somewhat higher percentage of negatives was expected among the group of children previously Schick tested, the lack of correlation was apparent between these groups and invited investigation as to the duration of the immunity.

A group of 170 children who were Schick negative 4 to 6 weeks after receiving one injection of alum precipitated toxoid of either 10 or 20 antigenic units, were tested after 6 to 7 months. Of this group previously Schick negative, 16, or 9½ per cent, had become positive.

* Read at a Special Session on Diphtheria Immunization of the American Public Health Association at the Sixty-third Annual Meeting in Pasadena, Calif., September 4, 1934.

TABLE I

SUMMARY OF RESULTS OBTAINED WITH ONE INJECTION OF 1 C.C. OF TOXOID

Preparation	*Units per 1 c.c.*	*Number of Children in Group*	*Per Cent Schick Negative at End of:* 4 Weeks	6 Weeks	8 Weeks	6 Months	12 Months
New York City Toxoid.....	8½	220	..	..	40	..	57
New York City Toxoid modified with 0.2 per cent alum.....	8½	388	..	..	47	..	61
Michigan Toxoid	7½	217	..	..	42	..	61
Alabama alum precipitated Toxoid	10	290	64	73	..	84	..
Michigan alum precipitated Toxoid	20	239	62	72	..	83	..
New York City alum precipitated Toxoid	42	193	65	73	..	86	..

McGinnes and his coworkers [2] found the reversion of Schick negatives to Schick positives took place in 5.6 per cent of 342 children. Another group of 71 children who were Schick negative 4 to 6 weeks after receiving one injection of alum precipitated toxoid of 42 antigenic units showed reversion of 3 per cent to Schick positive when retested after 6 to 7 months. The age group of children showing reversion of the Schick test runs parallel with the age distribution of the entire group.

Ten of the 18 children who showed reversion of the Schick test were retested 6 weeks later, and at the same time blood was taken from 7 for the purpose of ascertaining the antitoxin concentration.* The results of these tests are shown in Table II.

It may be seen that 7 children showed an increase in their immunity status by the stimulus of the preceding Schick test injection and that 3 out of 7 had antitoxin above the so-called immunity level of 0.03.[3]

REACTIONS

The frequency and degree of reactions have been partially reported.[1] A detailed questionnaire was sent to the parents of all children who received one of the toxoid preparations. Over 66 per cent of the questionnaires were returned and it is reasonable to assume that there were no moderate or severe reactions among those who failed to reply.

While we are aware that the parents' interpretations of reactions might not coincide with the clinical picture, we consider them of importance because they reflect the parents' observations.

Table III, which represents an analysis of over 1,100 replies, shows the per cent of reactions in the entire group of children regardless of age.

When analyzed by age group, reactions are found to be much less frequent in the age group under 8, reactions increasing in frequency as age increases.

Attention is called to the occasional occurrence of general reactions immediately following the administration of the Schick test in children who had previously received the Schick test and toxoid. These reactions previously described,[1] while of short duration, were of sufficient severity to justify alarm over the character of the attack, which resembled anaphylaxis.

Another case of severe reaction was observed on November 27, 1934. A boy, age 5, had a preliminary Schick test with controls on April 6, 1934, which was read on April 11. At that time he received 1 c.c. of alum pre-

* Antitoxin concentration was determined through the assistance of Dr. W. E. Bunney of the Michigan Department of Health.

TABLE II

SHOWING REVERSION OF SCHICK TEST IN A GROUP OF CHILDREN AND RELATIONSHIP TO ANTITOXIN CONCENTRATION

Case No.	1	2	3	4	5	6	7	8	9	10
Child's Age	8	8	11	7	6	5	6	4	6	7
Preliminary Schick test April, 1934	xxx	xxx	xx	xx	xx	xxx	xx	xxxx	xx	xxx
Alum Precipitated Toxoid, 4-16-34										
Schick test May, 1934	—	—	—	—	—	—	—	—	—	—
Schick test Oct., 1934	x	xx	x	x	xxx	x	x	x	x	x
Schick test Nov., 1934	x—	—	xx	—	—	x	xx	—	—	—
Antitoxin units per 1 c.c. Nov., 1934	<0.002	>0.1	<0.002	0.05	0.05	0.01	>0.01 <0.05	Not obtained		

cipitated toxoid. When retested on May 28, the child was Schick negative. On November 27, together with many other children he was again retested to study the frequency of reversion of Schick tests. In less than 15 minutes after the test, while the author was on his way to another school, the nurse noticed that the child had developed urticaria and redness over his entire body, swelling of the face and severe pain in the epigastric region. In this case there was no shortness of breath and though he was generally distressed, he did not require the administration of adrenalin. A similar case of severe reaction has been reported by Shiffrin.[4]

Though these reactions are fortunately rare, they tend to serve as a restraining influence in the acceptance of toxoid as the preparation of choice. Undoubtedly the repetition of the Schick

TABLE III

PER CENT OF REACTIONS FOLLOWING 1 C.C. INJECTIONS

			Local			*General*		
Preparation	*Units per 1 c.c.*	*Per Cent Having No Reaction*	*Per Cent Mild*	*Per Cent Moderate*	*Per Cent Severe*	*Per Cent Mild*	*Per Cent Moderate*	*Per Cent Severe*
New York City Toxoid..	8½	26	65	8	..	20	3	1
New York City Toxoid modified with 0.2 per cent alum	8½	28	67	7	..	28	6	1
Michigan Toxoid	7½	33	63	3	..	12	8	1
Alabama alum precipitated Toxoid	10	24	70	6	..	24	4	..
Michigan alum precipitated Toxoid	20	27	69	4	..	22	3	..
New York City alum precipitated Toxoid...	42	12	86	2	..	38	1	..

test was a contributing factor, but elimination of the test could scarcely be offered as a solution of the problem. Bunney's[5] opinion on the subject is of interest:

> The results suggest a very definite need for a study of the Schick test following immunization with alum precipitated toxoid. If an injection of toxoid in contrast to a toxin-antitoxin injection, renders a certain number of children sensitive so that an injection of diphtheria toxin in the Schick test causes shock, and perhaps in some individuals a false straight positive reaction; then it might very well be possible that an injection of alum precipitated toxoid, in which the toxoid is being absorbed from the site of injection over a considerable period of time, would result in a larger number of such sensitized children.

CONCLUSIONS

1. Analysis of the results obtained clearly indicate the superiority of alum precipitated toxoid as an immunizing agent.

2. Preparations of higher potency make only a moderate difference in the percentage of children developing a negative Schick reaction.

3. Local and general reactions are more frequent in the preparations of higher potency.

4. Immediate reactions which follow the administration of the Schick test in previously immunized children deserve most careful study.

5. The duration of immunity effected by alum precipitated toxoid needs careful investigation. It is possible that preparations of higher potency may confer more lasting immunity.

6. The creation by the American Public Health Association of a committee to evaluate the results of the studies made by a large group of workers in the field of diphtheria prevention will be a helpful factor in acquiring more facts and better knowledge of what may be expected from the use of alum precipitated toxoid.

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Potability of Water from the Standpoint of Fluorine Content *

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MOTTLED enamel was first described in the United States by Black and McKay [1] although it had been described in 1901 by Eager,[2] who found it in Italian immigrants. Their findings seemed to point to local water supplies as responsible. It was not, however, until 1931 that it was found to be due to fluorine in the water. The proof [3] consisted of giving water which was known to cause human mottled enamel to rats, and also feeding to other rats small amounts of sodium fluoride. In both cases mottled enamel was produced. Added proof in the way of chemical analysis showed low concentrations of fluorine in waters not associated with enamel and high concentrations in waters which had produced the defect. Churchill [4] added further evidence by analyzing waters from several parts of the United States. High fluorine contents were found in certain endemic regions.

METHODS OF FLUORINE ANALYSIS

Since our proof of the causal relationship of fluorine to mottled enamel, the question of potability of water from the standpoint of its fluorine content has become of prime importance. Lack of accurate methods of fluorine analysis has impeded progress in determining the toxic level.

At the time the original investigation was made in 1930 the most promising method available was that of Ross, Reynolds, and Jacob,[5] in which dry silicon tetrafluoride was distilled into water and the resulting hydrofluosilicic acid determined by titration with a standard base. Using this method in a limited number of analyses, it appeared that waters containing 2 p.p.m. or more of fluorine were associated with mottled enamel as its cause. A year later an extensive investigation [6] was carried out in Arizona for the twofold purpose of disclosing endemic areas in the state and obtaining evidence from analyses of water supplies from both endemic and non-endemic areas by which it would be possible to determine definitely the concentrations of fluorides in drinking water which interfere with normal enamel development.

Since the volatilization method did not lend itself well to routine determinations, another method of analysis was sought, and the Fairchild method was selected. In this method ferric iron in excess is added to the fluorine containing water. The iron combines with the fluorine, probably forming a complex ion. The uncombined iron is then determined iodimetrically and the amount of fluorine present calculated.

The survey disclosed about 45 towns or rural districts in Arizona in which

* Read at a Joint Session of the Laboratory and Public Health Engineering Sections of the American Public Health Association at the Sixty-third Annual Meeting in Pasadena, Calif., September 4, 1934.

mottled enamel is endemic. Analyses of 110 public and 75 private water supplies show a fluoride content ranging from 0.0 to 12.6 p.p.m. Concentrations above 2.7 p.p.m. were found to be definitely toxic, that is, always associated with mottled enamel in its consumers.

Because of the great interest in this problem, several more sensitive methods for fluorine determination have been developed recently, and the Fairchild method has been shown to give results which are far too high.

The methods of Foster [8] and of Armstrong [9] both depend upon the removal of fluorine by the addition of an excess of ferric chloride as in the Fairchild method. The uncombined iron is determined colorometrically, Foster using ammonium sulphocyanate and Armstrong acetylacetone.

Foster has also found that sulphates, chlorides, and other ions act similarly to fluorine and withdraw a certain amount of iron from solution. The effect of these ions is therefore nullified by adding slight additional amounts of ferric chloride.

The Steiger method,[10] one of the older methods for fluorine, has been modified by both Wichmann [11] and Boissevain.[12] In this a peroxidized titanium chloride solution is bleached by fluorine, the amount of fading being proportional to the amount of fluorine present. It is somewhat difficult to detect differences in the fading produced by samples varying by 0.1 p.p.m. fluorine in ordinary Nessler tubes. Undoubtedly the photo-electric colorimeter of Wilcox [13] used to compare the ferric acetylacetone colors of Armstrong's method would be more sensitive than comparisons in Nessler tubes. Sulphates in excess are known to interfere with this method, and correction is made if the concentration is too high.

Willard and Winters,[14] Thompson and Taylor,[15] and Sanchis [16] use alizarine red-zirconium nitrate as an indicator in their determination of fluorine.

The Willard and Winters method depends upon removing interfering elements by a preliminary distillation. The fluorine in the distillate is titrated with thorium nitrate, using the above mentioned indicator.

The Sanchis method has been modified from the Thompson and Taylor method for fluorine in sea water and is adaptable to the analysis of fresh waters. Chloride and sulphate effects up to 500 p.p.m. are nullified by the addition of hydrochloric and sulphuric acids.

COMPARISON OF ANALYTICAL RESULTS

Analyses of many waters for fluorine using the Fairchild, Foster, Willard and Winters, and Sanchis methods have been made by the writer and the results compared. These data are presented in Table I. Further evidence is here given that the results of the analysis of waters by the Fairchild method are abnormally high.

On the other hand, results by the Foster, Willard, and Sanchis methods compare very closely with each other, the results obtained by any one of these 3 methods being practically the same.

The results of the analysis of 54 waters by these 4 methods are grouped into 2 classes: (1) waters which are known to be associated with mottled enamel, and (2) those which have been found not to cause mottled enamel. This division is based on tooth examinations made by M. C. Smith.

It may be seen by inspection of Table I that the 33 waters associated with mottled enamel, as analyzed by the Foster, Willard, and Sanchis methods, have a fluorine content varying from 0.7 p.p.m. to 13.2 p.p.m. Twenty-one waters which did not cause mottled enamel had fluorine contents ranging from 0.1 to 0.8 p.p.m.

TABLE I

WATERS ASSOCIATED WITH MOTTLED ENAMEL

Lab. No.	Location	Method			
		Fairchild	Foster	Willard	Sanchis
		p.p.m.	p.p.m.	p.p.m.	p.p.m.
20487	Ajo	5.8	2.2	...	...
20670	Aztec	12.0	7.2	6.8	8.0
20853	Buckeye	2.4	1.5	1.2	1.3
20106	Cochise	2.0	0.9	0.9	...
20693	Concha	7.5	3.9	4.7	...
20104	Douglas	5.2	2.4	2.4	2.5
20663	Florence	2.8	0.8	0.8	...
20689	Gila Bend	10.6	6.8	6.7	...
F296	Gila Riv.	3.0	0.9	1.0	...
20708	Joseph Cy.	2.8	1.0	1.0	...
20482	Hayden	3.0	1.3	...	1.4
F73	Wilson, Idaho	16.8	13.2	11.1	...
20662	Laveen	2.5	1.2	1.3	1.7
20483	Mammoth	6.0	3.7	3.9	4.0
20121	Mesa (R)	3.1	1.0	1.1	...
19761	N. Gila Sch.	9.1	1.9	2.4	...
20486	Oracle	3.0	1.1	1.5	...
20487	Pinal Co. Hwy. Dept. Hayden	7.5	3.0	...	...
20690	Roll	8.7	4.7	...	5.0
19762	Roll Sch.	3.3	1.3	...	...
20664	Roosevelt Sch. Dist. # 66	3.5	1.5	1.9	1.7
F82	San Xavier	3.0	0.9	1.0	...
20772	Sentinel	9.3	6.0	5.5	...
20673	Sentinel (R. R.)	7.7	5.9	4.5	...
F176	St. David, Merril Sr.	4.6	1.1	1.8	...
20694	Topock	4.7	1.0	...	...
20480	Tucson Brickyard	2.7	1.0	1.1	...
20489	Winkleman	2.8	1.1	1.1	1.0

WATERS NOT ASSOCIATED WITH MOTTLED ENAMEL

20683	Avondale	1.8	...	0.4	...
20656	Benson	0.9	0.4	0.3	...
20122	Chandler	2.1	0.7	0.8	0.8
20491	Clarkdale	1.2	0.3	0.5	0.3
20696	Concha	0.9	0.4	0.3	...
21718	Fairbanks	0.3	0.1	0.4	0.3
20699	Flagstaff	1.1	0.5	0.3	0.2
20490	Jerome	1.1	0.2	0.3	0.1
19769	Pomerene	1.4	0.5	0.3	...
19770	Pomerene Sch.	0.9	0.5	0.6	...
20661	Prescott	1.1	0.2	0.6	0.1
20100	Tombstone	0.2	0.1	0.3	0.0
20665	Wickenburg	1.5	0.1	0.4	0.2
20475	Willcox, Stewart Sch.	1.2	0.3	0.4	0.25
20697	Winslow	0.7	0.2	0.2	...
20859	Yuma	2.0	0.4	0.4	...

Severe mottled enamel of the deeply stained and pitted type appear to be associated with waters containing well over 2.0 p.p.m. of fluorine. Waters containing from 1 to 2 p.p.m. were always found associated with a mild to moderate type of this dental defect. That the lower limit of fluorine content in water which causes mottled enamel probably is slightly less than 1 p.p.m. is shown in Eagar, Tucson Brickyard, Florence (private well), San Xavier, Cochise, and Springerville. These waters were found to produce a very mild type of mottled enamel. In Eagar the effect was variable. About 50 per cent of the children in the community had chalky white patches on the teeth, characteristic of mild mottling. Again it may be noted that other waters with a fluorine content of 0.7 to 0.8 p.p.m. did not have a toxic effect upon the teeth, as, for example, the city of Chandler. This community, however, is surrounded by areas in which mottled enamel does occur and in all probability has a fluorine content which is just below the toxic concentration. It is difficult to establish the exact fluorine concentration in a water supply which will damage the teeth of its users. The evidence indicates strongly that any water with a fluorine content of 0.9 p.p.m. (when analyzed by the Foster, Willard, or Sanchis methods) or over is dangerous from the standpoint of probable damage to the teeth. No Arizona water has yet been found containing more than 1 p.p.m. of fluorine which has not been shown to cause mottled enamel.

Dahle,[17] Associate Referee for the A.O.A.C. has compared the Foster, Willard, and Steiger methods by means of analysis of synthetic waters made by 8 chemists in different parts of the country. His synthetic water "A" made up to contain 2.08 p.p.m. of fluorine was found to contain 2.08 p.p.m. by Foster method, 2.27 by the Willard method, and 1.9 p.p.m. by the modified Steiger method. Little difference in results obtained by these 3 methods was apparent. Therefore it is safe to conclude that the toxic concentration of fluorine is similar when determined by the Foster, Willard, Sanchis, or Steiger methods, and has as its lower limit 1 p.p.m. or slightly less.

REMOVAL OF FLUORINE FROM WATER SUPPLIES

Because certain communities find it impossible to secure waters containing too little fluorine to cause mottled enamel, a practical method of treating the water to remove fluorine must be developed. Many years ago Carnot [18] reported that it was possible to remove fluorine from water by the use of bone. This removal is probably due to the fact that the CO_3 in bone $Ca_{10}CO_3(PO_4)_6$ can be replaced with fluorine. A single trial in our laboratory has been made of this method. When 67.5 mg. of bone was used per liter of water, the original fluorine concentration of 2.5 p.p.m. was reduced to 1.7 p.p.m. The possibilities of this method are under further investigation.

Willis of the Colorado Springs High School [19] has studied the waters in the mountains above Colorado Springs in an attempt to determine the source of fluorine in Colorado Springs water supply. Analyses of water from the same source showed lower concentrations of fluorine during winter than summer, hence the possibility of "freezing out" the fluorine suggested itself.

Through the courtesy of the Arizona Ice and Cold Storage Company in Tucson it was possible to conduct a freezing experiment under commercial conditions. Water originally containing 0.7 p.p.m. fluorine was fortified with a sodium fluoride solution. A concentration of 3.4 p.p.m. resulted. The tank containing the mixture was placed in the

brine to freeze. Agitation was obtained with compressed air. Two cores were removed. The cake of ice was sampled and analyzed for fluorine by the Sanchis method. Results are shown in Table II.

TABLE II

REMOVAL OF FLUORINE BY FREEZING

	Fluorine in p.p.m.
Original Water	0.7
Water and added NaF.	3.4
First Core Removed.	6.0
Second Core Removed.	4.0
Sample No. 1 Outer Portion. .	0.7
Sample No. 2 Outer Portion. .	0.4

It is a well known fact that ice freezes almost pure. In this case the impurities were concentrated in the core. It is doubtful whether this method of fluorine removal would be any more practical than distillation.

A verbal report of Dr. Frary of the Aluminum Company of America, at the meeting of the American Chemical Society in Chicago in 1933—that activated aluminum would remove all traces of fluorine from solution—apparently has not yet been published.

Boruff [20] has reported the removal of fluorine from water by the use of aluminum sulphate. Water containing 2 to 3 p.p.m. of fluorine required 85 p.p.m. of the anhydrous salt, or 165 of the crystalline, to lower the fluorine concentration to the safe level of 0.5 p.p.m. At $4.42 per 100 lb. for aluminum sulphate, the cost of treating 1,000,000 gallons of water would be $60.77. This cost is prohibitive for municipal supplies. If only drinking water were treated, the cost of 6.07 cents per 1,000 gallons for chemicals would be very economical. No reports of the use of this method have been noted. The writer has attempted to corroborate Boruff's results and especially to modify his procedure to render it more practical by securing more complete removal with less aluminum.

In some cases residual aluminum remained in the solution. Under these conditions fluorine results by the Foster method were lower than by the Willard and Winters method, and it is assumed that aluminum sulphate was responsible for this. Further studies are being conducted to discover the cause.

McKee and Johnson [21] have recently suggested the removal of fluorine by the use of activated carbon after the pH of the water has been reduced below 3.0. Cost of carbon, acid, and lime will not permit the use of this method by a municipality. The practicability of any of the heretofore proposed methods for the removal of fluorine from municipal supplies seems doubtful. When it is realized that only 1 p.p.m. of fluorine in water is necessary to cause mottled enamel, it is not surprising that attempts to remove these small amounts have not met with greater success.

SUMMARY

1. A concentration of 0.8 to 0.9 p.p.m. of fluorine in water has been found to cause mottled enamel if this water is consumed while the children are of a susceptible age.

2. A comparison has been made of 4 methods for the determination of fluorine in water.

3. Experimental work has shown the Foster method to be unsatisfactory when used for the fluorine determination on waters which have been treated with $Al_2(SO_4)_3$ for fluorine removal if considerable aluminum remains in solution.

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DISCUSSION

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MR. SMITH has summarized effectively the extent of our present knowledge in regard to the various aspects of the problem presented by the occurrence of fluorides in potable waters.

His timely remarks on the importance of the part played by analytical procedures in any attempt to ascertain the toxic level of fluoride in water, based on field observations, cannot be overemphasized. Without a reproducible unit of measure, little progress can be made in the evaluation of data obtained from widely scattered localities.

As pointed out the methods which have been used most generally in recent years can be grouped into two main classes. Those in one class make use of the fact that fluorides interfere with the quantitative estimation of ferric ions, while those in the other class depend on the effect of fluorides upon the color produced when alizarin reacts with zirconium in a hydrochloric acid solution.

The Foster method is the best known of the procedures in which use is made of the ferric ion reaction. This came at a time when the inconsistency of the results obtained by the then available methods had thrown laboratory findings into a hopeless state of confusion. Its relative superiority over the other methods caused its ready acceptance by those confronted with the need of making fluoride determinations. However, the results obtained by it were not always reliable nor easily duplicated. Boruff and Abbott [1] pointed out a number of theoretical considerations by which they proved the fundamental weakness of the method even in the absence of interfering substances. When to this is added the effect that reducing agents such as hydrogen sulphide have upon ferric ions, the difficulty in which the thiocyanate colors can be matched when using Nessler tubes or the

Duboscq type colorimeter, the errors introduced by the rapid fading of the color, the need of corrections for the interfering effect of certain ions commonly present in water, etc., it is surprising that results comparable to those given by other methods are so often obtained. It is true that the use of photronic cells and the substitution of other indicators, such as acetylacetone, for the thiocyanate have done much to improve the procedure. It is very questionable, however, that these improvements can overcome the fundamental weakness of the ferric ion reaction.

On the other hand, the relative freedom from common interfering substances of the zirconium alizarin methods places them at a decided advantage over the ferric ion procedures. The Willard and Winter distillation method, as modified by Boruff and Abbott [1] is at this time recognized as the most reliable method at our disposal. Except in very unusual waters, equally satisfactory results have been obtained consistently by the direct zirconium alizarin colorimetric procedures. One of the outstanding advantages of these colorimetric methods over those using the ferric ion reaction is the permanency of the colors produced and the ease with which the colors may be compared with the standards when using ordinary Nessler tubes.

In the matter of analytical procedures, we may say that considerable progress has been made. We have now at our disposal several reliable methods and it is only a question of deciding which of these is best adapted to our needs.

The results obtained by these better procedures indicate that fluoride concentrations in excess of 2 p.p.m. are, as a rule, associated with more or less noticeable defects in tooth structure. Between this concentration and 1 p.p.m. the toxic effect produced by a given quantity of fluoride in the water seems to vary considerably in different localities. This apparent fluctuation in toxicity suggests that other factors may play an important part in the effect which the fluoride present in the water supply exerts upon tooth enamel.

One of these may be the amount of fluoride taken into the system through articles of diet other than water; another is the possible presence in the water or other food products, of ions which in some way prevent the fluorides from exerting their toxic effects.

Some of the recent work done by Smith and Leverton [2] at the University of Arizona has shown that the total amount of fluoride ingested, irrespective of its source, is one of the controlling factors governing the production of mottled enamel. As we know, fluorides are present in variable amounts in most of our food products. It is interesting to note that milk and certain vegetables have been considered by physiologists as the source from which the body obtains its normal fluoride requirements. Although there are no experimental data available to establish the relationship between the fluoride content of food products and that of the water which helped to produce them, it seems reasonable to believe that a more or less direct relationship exists. If this were the case, it would be logical to expect that in isolated farms or small farming communities, where practically all foodstuffs are produced locally and where the same water is used for all purposes, the fluoride content of the water will be a deciding factor in controlling its potability. On the other hand, in larger communities, where the water and food supplies are drawn from widely scattered areas, the same fluoride content in the water, within reasonable limits, may not be of much significance.

The second factor to be considered, has to do with the well known physiological phenomenon produced by ion

antagonism usually referred to as the balancing function of salts. A number of cases are known in plant and animal metabolism where the toxicity of certain ions is diminished if not altogether neutralized by the presence of some other ion or ions which by themselves may or may not be detrimental. The extent to which this neutralization takes place depends upon the amount of each ion present, there being a certain proportion at which the balancing effect will be greatest. The Smith-Leverton studies previously mentioned have demonstrated the inhibiting action which calcium exerts upon the potential toxicity of fluorides. This interference, whether due to ion antagonism or merely a solubility effect, clearly indicates the possibility that other untried combinations may bring about similar results.

Definite information on these factors would go a long way toward making possible the intelligent appraisal of the potential toxicity of fluoride concentrations within the doubtful range. This information may, in the absence of practical methods for fluoride removal, even suggest the introduction of substances containing fluoride antagonistic ions in the diet as a logical solution of the problem when a better source of water supply cannot be obtained.

Until more definite information on the various factors involved is available, we may, for the sake of safety, look with suspicion upon waters containing fluoride in concentrations greater than 1 p.p.m.

Much has been learned, but there is still a lot to be known. The foundation has been laid and a wide field of research is open to those who, having the time and facilities, welcome the opportunity to be of service to their fellow men.

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School Health Studies

DOCTEUR R. H. Hazemann, Medecin-Inspecteur, de l'Office Public d'Hygiene Sociale, Prefecture de la Seine, of Paris, writes to the Association that the article by Dr. Donald B. Armstrong, in the January 1935 *American Journal of Public Health,* entitled "Report of Special School Health Studies in New York City," was so interesting that he translated it into French for a medical meeting even before he had official permission for the translation or copyrighted material. The Association is glad to join Dr. Armstrong in approving the translation of this material.

Relation of Action of Chlorine to Bacterial Death*

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CHLORINE in the form of gas or of its many compounds has found wide use in public health work. It is perhaps the most popular of the numerous germicides—seemingly an effective agent in causing bacterial death.

This bacterial death, however, is a somewhat misunderstood phenomenon, largely because there are no well defined criteria for it. With bacteria any measure of death is negative, a sort of inverse to life, since one must grow the organisms surviving in order to arrive at the number dead. With animals, any of several phenomena can be used as an index of death—for example, rigor mortis and cessation of heart beat. With higher plants there are criteria, somewhat less well defined, that tell when life is gone, but in the case of bacteria, no such tests exist.

Fulmer and Buchanan [1] have used a vital staining technic which they claim is a satisfactory criterion under certain conditions. According to them, "All cells which take up the stain (methylene blue) are dead, that is, they no longer can reproduce." Five words of this quotation tell the story—"they no longer can reproduce." The reproductive phenomenon in some form is always used in studies of bacterial death; and all our concepts of lethal action are based on the hypothesis that if the bacteria do not reproduce they are dead.

That this basic premise is incorrect has been shown by Rahn and Barnes.[2] Although these authors used yeast as a test organism, their results are applicable to bacteria. They subjected bottom yeast to the action of 4 lethal agencies: heat, mercuric chloride, ultraviolet light, and X-rays. At definite intervals the survivors in the cultures were enumerated by the plate count (to show reproduction), gas production (to show enzyme action), staining reaction (to show dead tissue), and coagulation. The cells lost first their power of reproduction, then their enzyme activity. Considerably after losing these 2 powers, they took the stain; and later they coagulated. Data in this paper indicate that for a given time the plate count showed but 0.0002 per cent survivors, whereas the fermentation and stain test showed 5 per cent and 39 per cent living, respectively. Rahn and Barnes consider that the coagulation of the cell protoplasm is not the fundamental reaction of cellular death.

This concept is at variance with a considerable body of opinion to the effect that coagulation is important. Heilbrunn [3] accepts the latter view and cites many instances of belief in it. Bancroft and Richter [4] have studied the action of germicides under the ultramicroscope, using various lethal agents upon yeast cells. They report seeing a

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visible coagulation that led them to "understand readily why the cells die." The "death" that they described was, unfortunately, not checked by the usual means. Perhaps the most original part of their work was the direct observation that the coagulation within the cell is reversible. This reversibility they noted; and, if there is any correlation between their coagulation and death, the death process too must be reversible within limits. They further postulate the grossly empirical equation—

Living bacteria + disinfectant = dead bacteria.

Given such an equation, they believe, certain reaction velocities would obtain. Increasing the disinfectant increases the velocity to the right (McClintic).[5] Increasing the dead bacteria increases the velocity to the left (Lange).[6] Increasing the living bacteria, however, throws the equation into a "hideous disagreement"—to use their words. It is their idea that the death phenomenon is reversible—a conception not very new in bacteriological literature. A number of authors have reported such findings. Rodewald[7] placed the organism causing fowl cholera in a 0.1 per cent mercuric chloride solution. After several minutes the cells were removed and washed. Mice inoculated with them were killed. As a control, Rodewald treated a similar quantity of cells in like manner and attempted to grow them. He failed: the cells were "dead." Similar experiments are reported by Liesegang,[8] Süpfle and Müller,[9] Müller,[10] and Gegenbauer.[11] All these authors treated cells with various germicides, and by subsequent treatment with antidotes were able to cultivate them, whereas the untreated cells showed no evidence of growth.

The experiment of Süpfle and Dengler[12] is exceedingly interesting, since it apparently indicates that the death phenomenon is a function of the medium used to grow the organisms. Süpfle and Dengler dried anthrax spores upon silk threads, which were then suspended in a steam bath. After various periods of heating, duplicate threads were removed. One was placed in plain broth; the other in broth enriched by sugar and serum. In the richer medium, the spores germinated after exposure to the steam for a longer time—a very significant observation.

Still another argument can be used in indicate the possibility that the death reaction is reversible. Not only Chick,[13] but Madsen[14] and Nyman, showed that the action of a lethal substance in a bacterial population follows a rather orderly and predictable course: the death rate in such a population depends on the number of cells living at any given time. Expressed mathematically,

$$\frac{d\,b}{d\,t} = K\,b$$

This, on integrating and evaluating the constant of integration, gives

$$K = \frac{1}{t} \ln. \frac{b}{a}$$

In these equations "a" represents the initial number of cells, "b" the number of cells living after time involved, "t" the time, and "K" the rate of death. The second expression is easily recognized as the monomolecular equation so much used by the chemist for the rate of certain reactions. In this case it is an over-all equation reflecting the action of the germicide on the countless individual cells that make up the population. Some contend[15] that the lethal curve does not follow the monomolecular reaction exactly. There is little doubt, however, that the death phenomenon is chemical in nature, and so it must follow chemical laws in other respects and must be reversible or at least must reach an equilibrium somewhat short of actual death.

There is still another possible view regarding the death phenomenon.

Richet,[16] Gegenbauer,[11] and later Winslow,[15] and his coworkers[17] have all shown that for most substances, lethal or not, there are concentrations which first stimulate, then inhibit, and later in higher concentrations kill. Gegenbauer postulates zones of life, of dormancy, and of death, but dormancy is not death, though the criterion is likely to be the same—failure to reproduce.

Is it possible in much of the work where "death" has been studied that dormancy alone has been observed and that the cells were indeed alive? If so, most concepts of the action of certain germicides need revision. The work of Leonard[18] apparently leads to the same conclusion. Studying the phenol coefficients of certain compounds, he pointed out that the Hygienic Laboratory makes no claim for this method unless the germicide is closely related to phenol. Those with which he worked were not related. He attempted to determine whether the effect of his compounds was really lethal or merely bacteriostatic—that is, whether he had death or dormancy. To do this he took the 15 minute tubes of the usual test and transferred a loopful of the contents to tubes of fresh broth. In this way the germicide was further diluted. When the transfer was from the phenol tubes there was no growth, whereas the tubes made from his unknown showed growth.

We are especially interested in chlorine compounds, particularly the hypochlorites. These compounds are extensively used in dairy plants and on producing farms. In many instances, particularly on dairy farms, chlorine compounds are the sole means of sterilization. This situation is seemingly justifiable, since the literature is filled with studies made on such compounds. Always the results are reported to be satisfactory. Hypochlorites are supposed to have an exceedingly high phenol coefficient. Zoller[19] reports 300 for instance; Tilley[20] 80 to 90. In the light of Leonard's work, one wonders whether such high phenol coefficients are reliable. Possibly the reaction may be reversible. Furthermore, dormancy or bacteriostasis may have been the pitfall for the unwary in such studies.

We report the results of several experiments on the germicidal action of chlorine compounds. Our procedure was essentially the same as that of many others found in the literature, and the results are in entire accord with theirs. We went just one step farther, however, made observations that to us seem highly significant.

METHODS

For organisms we used milk in which bacteria had grown. This milk had a population well into the millions but contained no clots in which bacteria might be trapped. It was diluted with distilled water in various ratios. The presence of milk in our active mixtures has an excellent precedent in the work of Chick and Martin,[21] who postulate that the action of lethal agencies on bacteria is best carried out in an environment where bacteria can live. The bacteria in such milk were assumed, furthermore, to represent those forms that the disinfectant must combat in actual practice. Although the flora of our various experiments varied, the constancy of our results left no doubt that the practice was valid. The hypochlorite used was the liquid bleach of commerce, containing about 16 per cent available chlorine. It was strongly alkaline, for there was residual alkali in the container. In order to stop the action of chlorine and thus prevent a bacteriostatic action in the plate, 0.5 c.c. of a sterile 1 per cent solution of sodium thiosulphate was added to each plate which had previously been shown to have no effect on colony counts. Being interested in trends and not in

absolute values, we used only 2 dilutions. Some of the colony counts were exceedingly high. In order to count such crowded plates, we used a dissecting microscope, calibrating the field with a given magnification in terms of the petri dish area. Whenever resort was made to the microscope, 8 to 10 fields were counted, and averaged.

We cannot submit all our experiments for lack of space. Our results, furthermore, do not lend themselves to the process of averaging, dangerous in itself; so we submit a protocol (Table I). The higher numbers of colonies in plates with thiosulphate are to be noted. Particularly important is the fact that the 1–10 dilution gives a higher count than the direct plate (1–1).

A very satisfactory reduction in bacteria was caused by the action of the hypochlorite—a result in accord with the usual findings (Table I). The protocol also shows, as might be expected, that in most cases the counts are higher in the plate where the thiosulphate is present than where it is not. It is strange that more workers have not used thiosulphate to offset the effect of the germicide itself. The most interesting observation in our work is splendidly exemplified in the protocol: the 1–10 dilution made in addition to the usual direct plate is always the higher of the two. One may reasonably assume that if the plate made direct from the active mixture shows 5,000 colonies, then the 1–10 dilution should have but 500, but instead of 500, there are 28,000. We found this "jump up" throughout our work, regardless of the amount of milk present, the strength of the chlorine, the time of action, or the presence of thiosulphate.

TABLE I

PROTOCOL OF EXPERIMENTS SHOWING THE EFFECT OF CHLORINE ON BACTERIA

Initial bacterial count: 100,000,000
Ratio of milk to water: 1–10

Time of Action of Chlorine, Minutes	*Plate Dilution*	*Concentration of Chlorine p.p.m.*	*Liquid Bleach*	
			No Thiosulphate	*With Thiosulphate*
3	1–1	50	5,000	294,000
3	1–10	50	280,000	224,000
5	1–1	50	33,000	56,000
5	1–10	50	640,000	160,000
10	1–1	50	48,000	67,000
10	1–10	50	196,000	640,000
3	1–1	100	28,000	5,600
3	1–10	100	600,000	144,000
5	1–1	100	33,000	33,000
5	1–10	100	960,000	960,000
10	1–1	100	33,000	28,000
10	1–10	100	1,312,000	224,000
3	1–1	200	210	2,000
3	1–10	200	4,300	5,800
5	1–1	200	324	2,100
5	1–10	200	1,000	5,800
10	1–1	200	762	3,240
10	1–10	200	3,600	5,040

Diligent study has been made of the "jump up," which is doubtless a phenomenon similar to that described by Leonard. The next experiment follows naturally the conclusions of the one above. A mixture of bacteria with water was taken. It was our plan to plate this mixture both before and after

the action of chlorine. To check the plate count which—according to Rahn and Barnes—gives the first evidence of death, we also ran serial dilutions on the same mixture at the time the plates were made. We expected close agreement betwen the plate and the dilution tube before the action of chlorine. For instance, a mixture showing a colony count of 1,000,000 would also show growth in tubes out to at least the 10^{-6} dilution. After the action of chlorine we thought that there might be a discrepancy between the plate and the tube. The 1,000,000 bacteria (of the previous example) might be reduced to 1,000, as evidenced by the plate count. The serial dilution tubes should not show growth in dilutions greater than 10^{-3}. The experiment indicates the correctness of our reasoning. There is close agreement between the plate and tube before the action of chlorine (Table II, columns 2 and 3), but after no such agreement is noted (columns 4 and 5). The plate count shows the expected decrease up to 99 per cent. The serial dilution tubes, however, show growth in as great dilutions after the action of chlorine as before. There is, therefore, virtually no reduction as measured by this method (column 7).

By one method there is evidence of death; by the other, no such evidence. Both cannot be right.

Admittedly, errors are inherent in the dilution technic. However, a dilution procedure is also an integral part of the plate method, so that the inherent errors are more or less common in both cases. Furthermore, we obtained these results with such regularity that there is little doubt as to their essential truth. In the light of all the evidence cited, together with that which we submit, there are apparently few tests that can be relied upon where bacterial death is concerned.

SUMMARY

The literature shows that—

1. Bacterial death is to a certain extent reversible.
2. There are "zones" of life dormancy and death.
3. The action of some germicides result in dormancy and not death.
4. The measure of death is sometimes a function of the media used to grow the survivors.

TABLE II

COMPARISON OF THE PLATE COUNT WITH THE SERIAL DILUTION BEFORE AND AFTER THE ADDITION OF HYPOCHLORITE

Time of Action of Chlorine in Minutes	*Before the Addition of Chlorine: Numbers of Bacteria as Indicated by Colony Count*	*Before the Addition of Chlorine: Numbers of Bacteria as Indicated by Serial Tubes*	*After the Addition of Chlorine: Numbers of Bacteria as Indicated by Colony Count*	*After the Addition of Chlorine: Numbers of Bacteria as Indicated by Serial Tubes*	*Present Reduction as Indicated by Colony Count*	*Reduction Indicated by Serial Tubes*
1 — 3	9.2×10^5	1×10^7	8.5×10^3	1×10^6	98.9	+
1 — 5	8.0×10^5	1×10^7	7.2×10^3	1×10^7	98.8	0
1 — 10	3.0×10^6	1×10^8	1.5×10^4	1×10^7	99.3	0
2 — 3	1.24×10^4	1×10^5	7.8×10^3	1×10^6	37.0	0
2 — 5	8.9×10^3	1×10^6	7.8×10^3	1×10^6	12.0	0
2 — 10	2.0×10^4	1×10^6	7.8×10^3	1×10^6	61.0	0
3 — 3	4.9×10^5	1×10^7	4.9×10^5	1×10^7	0.0	0
3 — 5	3.8×10^5	1×10^7	3.6×10^5	1×10^7	4.0	0
3 — 10	3.0×10^5	1×10^7	4.8×10^3	1×10^7	99.0	0
4 — 3	2.5×10^5	1×10^6	1.2×10^4	1×10^6	95.0	0
4 — 5	1.2×10^5	1×10^6	3.1×10	1×10^6	99.0	0
4 — 10	1.9×10^5	1×10^6	1.9×10	1×10^5	99.0	0
5 — 3	2.3×10^7	1×10^8	1.2×10^6	1×10^8	95.0	0
5 — 5	2.5×10^7	1×10^7	7.8×10^5	1×10^5	95.0	+
5 — 10	2.1×10^7	1×10^6	4.1×10^5	1×10^5	95.0	+

Our investigations show that—

1. The colony counts increase as the dilutions increase.
2. There is no accord between colony counts and serial dilutions.
3. Growth was observed in as high serial dilutions after chlorination as before.

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Organized Medical Care

IT would appear that if medical care is provided on some organized basis, it should be possible to define the two fields so that there will be a complete curative and preventive service without any overlapping. In order to attain the fullest coördination, it would be desirable to have the provincial department of health responsible for the administration of all medical services, including hospitals, for which the province assumes responsibility. . . . The public health authority should have in mind that administrative responsibility does not mean a dictatorship. In England, health insurance is administered centrally by the Ministry of Health, which also appoints the regional officers, who act as medical referees and inspectors. The Ministry, in the exercise of its administrative powers, turns to the British Medical Association for advice and assistance. The strength of health insurance in England is largely due to placing control for the professional side of the medical benefit with the medical profession. This is something for public health authorities to keep in mind, if they are ever called upon to administer some form of organized medical care.

A fair criticism of health insurance is that it has not been preventive in practice and but little in outlook. It is not enough to render lip service to the idea of the practice of preventive medicine by the general practitioner, and then to disregard him in planning public health services. Under whatever name organized medical care is provided, it should make possible the systematic practice of preventive medicine, including periodic health examinations, by the general practitioner. . . .—The Relationship of Public Health to Medical Care, Grant Fleming, M.D., McGill University, Montreal. *Canad. Pub. Health J.*, Oct., 1934, p. 465.

Training Sanitary Inspectors*

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AN interesting experience in what a trained layman can accomplish is related by Dr. W. G. Smillie, Professor of Public Health Administration, Harvard School of Medicine:

Some years ago in Alabama an active campaign was being waged for the control of tick fever in cattle. Federal authorities aided by other specialists met with considerable opposition in certain areas. This took the form of having dipping vats dynamited and being shot at from ambush. As officials were discussing their predicament one evening, they were called on by a townsman, one John Boggan, who offered to help them. He suggested that he be taught the control methods and other facts about this disease, and then he would be willing to put these measures into practice. At the end of a short schooling, Mr. Boggan, who was amply supplied with native intelligence, went into the troublesome districts and successfully instituted the tick eradication campaign. This incident is applicable to the work of the sanitary inspector.

In the city of Washington, in 1922, a group of public health officials and educators held a conference to consider means of bettering the public service. Among their conclusions were the statements that the future of public health did not depend so much on new scientific data or a well informed public as it did on the matter of personnel. Dr. C.-E. A. Winslow, Yale School of Medicine, stated at that time, in reference to the specialists whose viewpoint and training are primarily concerned with the nonliving environment of man:

> We may naturally place in this general group one of the most important and neglected figures in the whole public health campaign, the inspector in the control of sanitary conditions and in supervision of food supplies. There is urgent need for a large group of men or women who do not necessarily require a college education but who do need substantial training of an elementary kind for which as yet no provision whatever has been made in the United States.

Edna Trull corroborates these statements in a study of this position. She finds that the statement "the health inspector is one of the most influential agents of the city in promoting and safeguarding the health of its citizens" cannot be questioned when the scope and importance of his duties are taken into consideration. "When the amount of personal responsibility, initiative and good judgment required of an inspector are taken into account, it is apparent that his training, ability, and status in the administrative personnel are entitled to consideration similar to that given to the other protective forces of the community."

The duties of the sanitary inspector have increased rapidly from the begin-

* Read at a Joint Session of the California Association of Sanitarians and the Public Health Engineering Section of the American Public Health Association at the Sixty-third Annual Meeting in Pasadena, Calif., September 4, 1934.

ning of this century to the present time. Formerly, the inspector acted as quarantine officer and enforced general nuisance laws, but with the advancement of the sanitary sciences, new methods for the detection, diagnosis, and control of communicable diseases were adopted. Higher standards of community sanitation also prevail over those of 30 years ago. All this has entailed new duties of a semi-professional nature which require, at the very least, a casual acquaintance with many sciences and an intimate knowledge of enforcement procedure. The inspector's daily routine now brings him into the field of medicine, sanitary engineering, bacteriology, chemistry, veterinary science, law, entomology, architecture, trade practices, and business management. To expect any ordinary individual to pick up the necessary information in a haphazard manner and efficiently to execute his mandatory duties is beyond reason. The only equitable solution to such a problem is to institute a well planned course of training which embodies the fundamental principles of environmental sanitation and standardized methods of procedure.

The health officer or specialist need not fear the increased knowledge and efficiency of the inspector for, rather than encroach upon the expert's field, the inspector relieves the technician of many of his routine duties. He thereby becomes a reliable worker supplementing, not obstructing, the work of his superior officers. Due to his broader understanding of the general affairs of the health department, the inspector through his extended field of contacts, becomes a valuable aid to the health officer in promoting public relations and assisting in special feature programs.

The need of training is felt not only in this country but in others where the control of certain communicable diseases is imperative or desired. A recent book on public health in the Union of Soviet Socialistic Republics contains the statement that, although the number of cases of dysentery, typhoid fever, typhus and relapsing fever is abnormally high, " there is no complete provision, as yet, for the special training of sanitary officers, or for insisting on their possessing a satisfactory diploma before they undertake public health supervision and control."

The only country which has satisfactorily dealt with this problem is England, where, as early as 1877, the Royal Sanitary Institute organized courses of training for sanitary inspectors. It is practically impossible for an individual to receive appointment as sanitary inspector without holding a certificate of proficiency from this non-official organization.

In the United States, many attempts have been made to establish this type of training. The most outstanding measures are those in effect in New Jersey, Tennessee, and Los Angeles County. In the first state, the legislature in 1903 passed laws for the licensing of sanitary inspectors; amendments in 1920 set up 3 classes of inspectors. These regulations have been supplemented by summer short courses at Rutgers University.

The Tennessee State Department of Health coöperates with the University of Tennessee in training inspectors for a 3 months' full-time period. These students are trained specifically for positions with the county health units. The regulations of the state department establish the following requirements for sanitary inspectors in county health departments: certificate of good health, necessary personal and moral qualifications to carry on their work adequately, high school graduate, 3 months' special instruction in sanitation or its equivalent, and at the time of initial appointment must be not less than 25 years of age, nor more than 35. This standard is probably the highest for any health department in this country.

In the Los Angeles County Health Department, a School of Sanitary Instruction was organized in 1930 and a full-time position of Sanitary Instructor created. This school has successfully completed 12 courses of instruction ranging from the fundamentals of sanitation to classes in teacher training.

There has been a group of inspectors working under the name of the California Association of Sanitarians who have twice presented to the state legislature a bill for registering sanitary inspectors. This measure would allow all inspectors to register during the first year after enactment without examination and, thereafter, a course of training from a certified school followed by an examination would be required before a registration certificate would be issued. The bill will be presented again to the next session of legislature.

The School of Government, University of Southern California, during the last 4 years has given certificates for certain types of governmental services. It is now considering the establishment of courses leading to a Certificate in Public Health Sanitation. To this end a graduate student, Grace Loye, is making an analysis of the duties of the sanitary inspector in Southern California, and also the required knowledge to execute these duties. Plans will be submitted to the American Public Health Association for correction and approval.

At this time I wish to submit the following plan which is based on the opinions of public health leaders and educators in this country:

1. That the American Public Health Association establish a Board for Certification of Sanitary Inspectors with a full-time executive secretary. Such board shall promulgate rules, procedure for certification, standards, and fees.
2. The Board shall appoint State Boards of Examiners to conduct examinations and certify applicants to the Association.
3. The Board shall set up a standard course of instruction for schools to teach. After 2 years, only those who have taken such a course will be eligible for examination.
4. The U. S. Public Health Service and Rockefeller Foundation should be encouraged to coöperate with this plan in those counties where grants are given for public health work.

A simple course requiring 168 hours of class and 132 hours of field work could be organized so that it may be given at a full-time school, night extension classes, or by a correspondence course supplemented by full-time attendance at a coöperating health department. Consideration should also be given to printing a manual of standardized procedure. Although universities ought to give this training, the courses should not be overloaded with university subjects but should rather apply to actual field conditions.

This plan agrees with the objectives of the Committee on Training and Personnel as published in the American Public Health Association *Year Book, 1932–1933*. The program of the committee proposed the following:

1. The definition of different types of public health workers
2. Registration of those workers who are now in service
3. The setting up of definite standards under which individuals may qualify for registration in the future
4. The development of a campaign of popular education for better tenure, adequate salaries, and the appointment of trained workers in the future
5. The development of suitable licensure legislation to necessitate the appointment of trained individuals

In fact, the proposed bill of the California Association of Sanitarians and the proposed certificate course of the University of Southern California both fit into the objectives of this committee.

The training and certification of sanitary inspectors should be given serious consideration at this time before public health departments return to their normal budgets. Such training will give the inspector an opportunity to give better service and entitle this position to a justifiable increase in salary.

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General view of the mouth of the Minneapolis-St. Paul sewer. This sewer is to be 24 miles long and will be located about 250 feet under the city. In the background are the historic Indian mounds under which the sewer will be tunneled. The car in the foreground is being loaded with concrete from the mixer. The Minneapolis-St. Paul Sewer District received an allotment of $16,095,000 from the Public Works Administration for this project which will take about 3 years to complete.

Response of the Peritoneal Tissue to Dusts Introduced as Foreign Bodies*

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IN recent years much interest has been shown in the response of body tissues to various dusts. The action of inhaled dusts has been studied extensively by Gardner, Mavrogordato, Gye, and others. Gye and Kettle,[1, 2] have studied the response to dusts injected intratracheally and subcutaneously. Policard[3, 4] has used the cornea and conjunctiva as the sites of study in his experiments. In 1924 experiments were begun at the Pittsburgh station of the U. S. Bureau of Mines[5] to determine the action and fate of various dusts when injected into the peritoneal cavity of guinea pigs. The conclusions reached at that time were that live animal tissue in all parts of the body tends to react in essentially the same manner to foreign bodies, and that fibrous tissue is formed in the peritoneal cavity by quartz and is not formed by limestone or coal.

Owing to the length of time required to obtain a reaction from dust by inhalation methods and the desirability of determining the harmfulness of a dust in a relatively short time, the peritoneal cavity was chosen for the site of study. This area is relatively circumscribed, exact quantities of dust can be easily and accurately injected, and the sterility of the material introduced can be preserved. The reaction produced by the dust in the peritoneum is essentially the same as that produced in the lungs. Identical reactions were found in each animal injected with the same material, under the same conditions and examined at the same interval after injection. The gross appearance of the dust nodules was sufficiently differentiated to afford a means of classifying the physiological response to the dusts.

Any dust, when first introduced into the peritoneal cavity, produced a foreign body reaction of varying degrees of severity. This injury subsided in from 1 to 3 weeks. The dust formed nodules of different sizes and shapes. The subsequent behavior of these nodules determined the type of reaction.

In the series reported here, there were 3 distinct types of reaction; an absorption, a proliferative, and an inert reaction. The absorption reaction consisted in the gradual disappearance of the dust from the tissues without the formation of scar tissue. In the proliferative reaction the nodules formed by the dust due to cellular proliferation became progressively larger up to a certain limit, after

* Read before the Industrial Hygiene Section of the American Public Health Association at the Sixty-third Annual Meeting in Pasadena, Calif., September 4, 1934.

which they became fibrosed. In the inert type of reaction the amount of dust found in the peritoneal cavity at the end of 360 days was approximately the same as that noted in 7 days. The nodules, however, changed in shape, became more flattened, and often showed considerable dispersion of dust particles into the surrounding peritoneum.

In preparing the dusts for injection it was desirable that the particle size of each in the series conform as closely as possible to that of the others. In one series of tests, particles that passed through a 325 mesh standard sieve were used. These were less than 43 microns maximum size. In another series, the material was elutriated in a Roller type air separator.[6] By this method less than 5 μ maximum size were obtained for all of the dusts, with the exception of soapstone, for which the maximum was 8 μ. The median particle size obtained by air separation varied from 0.75 to 1.7 μ (soapstone 3.5 μ). Such small variations in particle size appeared to be of no importance in comparing the physiological responses produced. The air separated particles closely approximate in size those inhaled under industrial conditions.[7] While the smaller particles were preferable because of their greater assimilation by the cells and the type of reaction was apparent earlier, the 325 mesh material gave the same gross reactions, and material this size is easily obtained without the necessity of expensive apparatus.

A 10 per cent suspension of the dust (previously sterilized in a hot air oven for 1 hour at 150° C.) in sterile physiological saline solution was prepared. Two c.c. of this suspension, equivalent to 0.2 gm. of dust, was injected intraperitoneally into each guinea pig under aseptic conditions. The animals injected with the air separated material were killed and examined 7, 14, 30, 56, 90, 180, and 360 days after injection, and those treated with the 325 mesh material were examined in 7, 14, 30, 56, and 112 days after injection.

With the exception of bituminous coal, the greater part of each of the dusts in this series was found in the peritoneum of the anterior abdominal wall, the most dependent portion of the peritoneal cavity. The site of the next largest collection was the omentum. Small nodules and dispersed collections of dust particles were also found in the inguinal canals, on the mesentery, liver, intestines, testes or uterus and diaphragm. A small amount of dust was occasionally found on the posterior abdominal wall. In the case of bituminous coal, the greater portion was found in the omentum and mesentery, while a relatively small part was present on the anterior abdominal wall. For comparison in describing the reaction, the nodules on the anterior abdominal wall were used.

PERITONEAL RESPONSE TO THE VARIOUS DUSTS

Calcite, limestone, precipitated calcium carbonate, gypsum, and Portland cement, after being injected into the peritoneal cavity, formed irregular, more or less discrete nodules. In the earlier stages, some congestion and edema was noted about the edges of the nodules. This irritation was relatively slight in all of these dusts except cement, where it was quite severe, due possibly to the chemical qualities of the dust. The initial stage of foreign body irritation had subsided before the end of 30 days after injection. The nodules became progressively smaller as the interval between injection and examination increased; and the decrease in size was accompanied by the production of a fine brown pigment, which appeared at the edges and on the surfaces of the nodules. Gypsum alone of these dusts did not cause the formation of the pigment. The original dust eventually disappeared leaving only brown pigment

particles at the sites of the nodules. Later the pigment likewise decreased in quantity, and in some animals disappeared entirely without the formation of scar tissue. This response, consisting of the disappearance or dissolution of the dust from the tissues has been designated, for the sake of description, as one of absorption.

Quartz and chert, after an initial stage of foreign body irritation similar to that noted in the previous group of dusts, produced nodules which became progressively larger in size. These nodules showed a tendency to fuse together. They presented the gross and microscopic appearance of cellular proliferation. The increase in size continued to progress up to 90 days after injection, after which it remained constant. The nodules then became more indurated and fibrosed. At the end of 360 days fibrosis was well marked. This type of reaction has been called one of proliferation. The chert used was highly siliceous.

Soapstone, carborundum, jewelers' rouge (hematite), anthracite coal, bituminous coal and precipitator ash produced the same type of foreign body reaction in the first 2 weeks as was noted with the other dusts. The early fixation reaction was not severe and subsided quite rapidly. The nodules, at first raised and rounded, became flattened and spreading with irregular edges. Numerous fine isolated particles were noted in the peritoneum adjacent to the nodules. Collections of dust particles were found at various other points in the peritoneum. The amount of dust found in the peritoneal cavity 360 days after injection was approximately the same as that noted in 7 days after injection. The injected dust was neither absorbed nor did it initiate a cellular proliferation. The only change noted was that of the distribution of the dust in the peritoneum. This type of reaction has been classed as one of inertness.

SUMMARY

The tissue of the peritoneal cavity responds actively to a dust introduced as a foreign body, the response being of such a character that it may be used as a basis for the classification of industrial dusts with reference to their pneumoconiosis producing properties. This response falls into 3 groups; absorption, proliferation, and inertness. While the animals were kept on test for as long as 360 days, the response was sufficiently well marked in 90 days to determine the type of reaction, and often, conclusions could be reached in 30 days, particularly if the reaction was one of absorption or proliferation. The reaction produced by each dust was constant and uniform in all animals injected with that dust. It appears that this response of the peritoneal tissue to various dusts can be used to indicate the possible harmfulness of an industrial dust.

CHEMICAL AND PETROGRAPHIC ANALYSES OF THE DUSTS

Calcite—Pure Iceland spar. Chemical analysis showed calcium carbonate, 99.8 and silica 0.1 per cent. Petrographic examination showed a high purity calcite. Median size of the particles, 1.4 μ.

Limestone—A high grade Pennsylvania limestone. Chemical analysis: calcium oxide, 54.4 per cent; magnesium oxide, 0.4; iron and aluminum oxides, 0.4; and silica, 1.5 per cent. Petrographic examination showed granular, irregularly rounded calcite. Median size of particles, 1.45 μ.

Precipitated calcium carbonate—A chemical by-product. Chemical analysis: calcium carbonate, 87.9; magnesium carbonate, 10.0; magnesium oxide, 0.1; iron and aluminum oxides, 0.6, and silica, 0.4 per cent. Median size of particles, 1.28 μ.

Gypsum—The uncalcined, natural mineral. Silica, 1.3 per cent. Petro-

graphic examination showed approximately 30 per cent as calcite in the form of rounded granules and irregular rhomboidal crystals and approximately 70 per cent as fragmented particles of gypsum. Median size of particles, 1.3 μ.

Portland cement—Chemical analysis: calcium oxide, 74.4; magnesium oxide, 2.8; silica, 21.1 per cent. Petrographic examination showed normal Portland cement. The particles were sharp and angular. Median size of particles, 1.5 μ.

Quartz—Two specimens were used. One was ground rock crystal of high purity. Chemical analysis showed 99.4 per cent of silica. Petrographic examination showed clear, crystalline normal quartz. Median size of particles, 1.7 μ. The other specimen was finely ground Pennsylvania quartz, commonly known as flint. Chemical analysis showed 99.1 per cent silica. Petrographic examination showed normal quartz of high purity. Median size of particles, 1.6 μ.

Chert—A highly siliceous chert. The waste product from the concentration of lead and zinc ores. Chemical analysis showed 76.1 per cent silica. Petrographic examination showed quartz and chert, stained with limonite, predominating. About 25 per cent of the silica was normal angular quartz fragments. Median size of the particles, 1.22 μ.

Soapstone—Chemical analysis: total silica, 49.9; calcium oxide, 1.7; magnesium oxide, 26.2 per cent. Petrographic examination showed about 30 per cent as tremolite, about 65 per cent as talc and about 5 per cent as dolomite. Median size of particles, 3.5 μ.

Carborundum—Pure manufactured silicon carbide. Petrographic examination showed no impurities. Median size of particles, 1.15 μ.

Jewelers' rouge—Pure ferric oxide in a finely divided state. Chemical analysis: ferric oxide, 98.3; silica, 1.5 per cent. Petrographic examination showed a high purity hematite as fine uniform particles. Median size of particles, 0.95 μ.

Anthracite coal—Two specimens of Pennsylvania anthracite were used. The chemical analyses were approximately the same. Petrographic examinations showed about 95 per cent as coal and about 5 per cent as inorganic material. Of the latter, about 60 per cent appeared as quartz and about 40 per cent as calcite, siderite and rutile. Median size of particles, 0.75 and 1.11 μ.

Bituminous coal—Two samples of Pennsylvania bituminous coal were used. Chemical analysis showed one to have 8.5 per cent ash of which 0.8 per cent was silica, and the other to have 8.0 per cent ash of which 3.5 per cent was silica. The median sizes of the particles were 1.15 and 1.19 μ.

Precipitator ash—Collected from stacks by electrical precipitation. Chemical analysis showed 44.7 per cent silica. Petrographic examination showed predominately perfectly spherical fused glass, rounded semifused masses made up of crystallites, some quartz fragments, calcite and coal. Median size of particles, 1.43 μ.

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Immunize Now

DIPHTHERIA immunization has been chosen by the May Day Committee of the State and Provincial Health Authorities of North America as the May Day-Child Health Day project for 1935. It was chosen because there has been practically no reduction since 1930 in the number of deaths from diphtheria throughout the United States. Some states have accomplished a marked reduction in the number of deaths, hence it follows that others have a proportionate increase, indicating that the proven method of prevention has not been satisfactorily applied. . . .

Believing that immunization should be the work of the private physicians, and in order to obtain the coöperation of physicians in this work, we offered the suggestion to each state health officer in the United States that he send a communication to each physician in his state urging:

That he remind his patients who have children under school age of the need for immunization

That he ask his patients to bring their children to be immunized

That he make it a routine of his practice in the future to immunize, during the first year of life, all babies under his care.

Even with certain states nearing the goal of No Deaths from Diphtheria, the Health Officers who have been heard from have responded enthusiastically to this suggestion. Officers of the U. S. Children's Bureau, the U. S. Public Health Service, the American Academy of Pediatrics, and the American Pediatric Society, promised that those organizations will coöperate.

The objective of the plan is to immunize all children between the ages of 6 months and 6 years, and to maintain this as a continuing service. Concerted action by state departments of health, the medical profession, and parents should make the accomplishment of this objective possible. Our task is to assist in getting information on the need for immunization to parents in all communities and to urge them to act without delay. . . .

Since the entire plan is based upon the coöperation of departments of public health and the medical profession, *both should be consulted* in any community plans for diphtheria immunization.—*A.C.H.A. News Release.*

Occupational Hazards in the Agricultural Industries*

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BEFORE the modern age of motorization, power, electricity, and the use of chemical products, such as insecticides and other poisons, the farmer, in his rural out-of-doors occupation, enjoyed the reputation of holding first place in longevity tables, but a recent census report on morbidity statistics, shows a 20 per cent reduction in urban infectious diseases, whereas in the rural communities the decrease is only 6 per cent. This is due to better medical care and public health program in our cities, and also to the fact that diseases such as malaria, hookworm, dysentery and diarrhea are more prevalent in the country. On the other hand, we find the farmers' daughters have about one-half the incidence of tuberculosis as the young women of the same age group working in the industries in the city.

Agriculture has developed many specialties, such as cattle and stock raising, dairying, horticulture, floriculture, truck gardening, cotton, forage and grain farming. As new mechanical processes were invented and the chemical and biological sciences developed, agriculture became an industry and farming was no longer a trade, but a profession.

It is rather difficult to secure morbidity reports from rural districts, and to determine the exact number of non-fatal accidents, since they are not reported to health officers as is customary in large cities.

OCCUPATIONAL ACCIDENTS

In most states, the farmer does not come under the Workmen's Compensation Act; and in those states which form the exception, only if the accident or death is the result of machinery or occupational disease. The number of accidental deaths among farmers and farm laborers in California for 1933, reported by the Industrial Accident Commission, was 67 out of a total of 401 claimed as a result of all causes chargeable to industry. The 67 deaths resulted from accidents arising from the use of farm machinery, such as tractors and motors, falls, fire, electric shock, run-aways, and kicking and horning by animals. Only 2 other vocations had higher mortality rates. Seventy-nine hundred and fourteen non-fatal accidents were reported, placing agriculture first in the 35 tabulated industrial divisions listed.

The toll of accidental deaths in agriculture is annually increasing due to the introduction of motor driven farm machinery and electric power. In some agricultural states, Nebraska as an example, in 1929 the accidental deaths on the farm were twice as numerous as those in the manufacturing industries.

* Read before the Industrial Hygiene Section of the American Public Health Association at the Sixty-third Annual Meeting in Pasadena, Calif., September 5, 1934.

In Kansas during the same year, of the 159 agricultural deaths, 22 were due to non-auto vehicular accidents—18 from farm wagons and 4 from hay racks; 25 were due to animals—kicks and falls from horses, gorings and injuries by cattle. Electricity took a toll of 37 victims, 8 of these being struck by lightning. Of 83 drownings, 5 occurred in stock tanks. Forty-nine persons were killed by special farm machinery, such as balers, thrashers, gang plows, and harvesters. In Nebraska and Kansas, 145 fatalities were caused by tractors, this important modern power machine taking first place as a cause of death and occupational accidents. Carbon monoxide asphyxiation from gas engine exhausts, falls from trees, etc., played a part in the fatal accidents.

The average age at death for the agricultural worker is 56.3 years, according to the U. S. Bureau of the Census life tables published in 1910.

In 1932 there were 15,000 accidental deaths among those engaged in gainful employment. The National Safety Council classified 3,500 of these as belonging to the agricultural occupations. In the same year, the Kansas State Board of Health listed 195 industrial deaths, 105 of these occurring in agricultural pursuits. The most common cause of fatality in connection with agricultural work was farm machinery, followed in order by injuries by animals, falls, lightning, and excessive heat.

Official reports for Canada for 1932 give the number of fatal industrial accidents as 961, of which 154 were chargeable to agriculture.

In England, according to the records of the Registrar General for 1900–1902, the death rate for occupied males in agriculture as compared with all males in the age group between 15 and 65 was 13.61 to 16.23.

According to the United States Census of 1930, the number of gainfully occupied males from 15 to 64 years of age was 14,013,367, with deaths from all causes 121,951 or a death rate of 8.70 per 1,000. The agricultural workers numbered 2,008,330, which included farm owners, managers, and laborers; and deaths from all causes were 13,479, or 6.71 per 1,000. The accidental death rate of this group of agricultural worker was 15.8 per 100,000 from all causes.

OCCUPATIONAL DISEASES AS A RESULT OF PLOWING AND HARVESTING

In our southern states, hookworm is common among the farmers and their families. Especially is this disease more prevalent where sanitation is lacking and field workers go barefooted. In the tropical rice, tea, and rubber plantations, it has been estimated that 60 to 80 per cent of the coolie farm laborers harbor this parasite.

One of the well known irritants to the unbroken skin is lime dust, prevalent during the period in which the tillers prepare the soil, spreading lime on the fields. Manure from herbivorous animals is used especially for the fertilization of the field and truck gardening. It is believed that horse manure contains many tetanus organisms. The danger of tetanus is greater in injuries among tillers of the soil and barnyard workers than among city workers, since the automobile has replaced the horse drawn vehicles.

The so-called tropical skin disease, the classical disease due to prolonged exposure to heat and light of the sun's rays, has long been known to agriculturists on the prairies of Kansas as "farmer's skin." In Kansas in 1932, 6 deaths were reported as due to excessive heat.

Pollens and irritating dusts from plants cause considerable morbidity among field laborers. I recall one farmer who on account of hay fever was obliged to vacate his hay ranch annually to go to the seashore when the red top

and timothy were being harvested. In California, annually, tons of hops are produced for export and home consumption; the hops produce fine hair-like processes, which produce the so-called hop pickers' ophthalmia.

OCCUPATIONAL DISEASES AMONG GRAIN AND FORAGE RANCHERS, TRUCK GARDENERS AND NURSERY MEN

In the harvesting and storing of grain, hay, and different forages, certain bronchial and dermatological lesions are likely to develop especially when these products are infected with mites and moulds. The dusts produced may be contaminated with spores of certain fungi; for example, the *Aspergillus* and *Penicillium*, which when inhaled produce asthma and a bronchial infection. Patients with early cases have coughs and muco-purulent expectoration but no fever, while advanced patients present all the symptoms of tuberculosis. Two such cases were treated among college boys, sons of farmers, who contracted the infection during the summer vacation. One was entirely cured by administering iodides and a vaccine. The sputum shows conidia and spores of the fungi with fragments of mycelium.

Sporotrichosis is another fungus disease due to one of the Sporotrichum species, which it is said, is saphrophytic on certain vegetables, such as lettuce, and found on the barberry (*Berberis thumbergii*). Truck gardeners and nursery men may become infected. The lesions produced are indurated, chancre-like swellings of the skin which may ulcerate and involve the lymphatics. The administration of iodides internally with tincture of iodine locally is reputed as specific. According to L. Schwartz, U. S. Public Health Service, dermatitis due to plant poisoning among gardeners and florists was due to this cause.

Certain grain regions are infected by a mite; the *Pediculoides ventricosus* causes the farmers handling the grain and straw to have a skin disease characterized by intense itching with an urticarial eruption. To the late Dr. J. F. Schamberger, of Philadelphia, belongs the priority in describing this affliction in this country (1910). The writer of this paper published in 1921 an article on what was called in California "Packers' Itch." Infected straw, used at a tile works and an electrical fixture factory, caused the itch. The mites were found on the straw. Fumigation and exposure of the straw to sunlight destroys the mite.

Floriculturists frequently suffer from dermatitis venenata, usually on the hands and arms, from coming in contact with certain plants. It is estimated that about 60 plants possess this irritating effect, notably primulas, sumac, pyrethrum, and chrysanthemums. The worst offender affecting farmers and lumbermen of the Coast Range Mountains of California is the *Rhus diversiloba* (poison oak). This plant produces an itching erythema which often develops into vesicles and bullae with marked swelling. The active principle is due to lobinol, isolated by McNair in 1921. The handlers of these plants constitute a considerable percentage of cases of occupational dermatitis: in New York state out of 449 cases, 14 per cent, and in Ohio out of 4,600 cases, over a 5 year period, 2 per cent.

OCCUPATIONAL DISEASES DUE TO PARASITES AND INSECTS

Examples of certain infections resulting from contact with animals and plants have been given in this paper. For elaboration, consult a work on medical entomology and note the various vectors, parasites, moulds, and scales that are responsible for infecting agricultural workers. The itch mites (*Sarcoptes*), the wood ticks (*ixodes ricinus*), the various ringworms (*Trichophytons*), and scald head (*Favus*),

are examples of etiological factors. There is also a common dermatomycosis that attacks stockmen, caused by the *Ectothrix trichophyton* which produces a ringworm, a common infection of horses and cattle.

Certain meals used for feeding dairy stock contain a mite known as the *Tyroglyphus* which produces an itch of the hands. This is the so-called "Grocers' Itch." Linseed meal or meal cake also causes an eczematous eruption on the hands of the dairyman.

In California during the past few years, several cases among farmers have been reported of "bites" by the Black Widow spider (*Lactrodectes mactans*). This highly poisonous insect inhabits old out-buildings, particularly privies, barns, and stables. Most of the cases reported were bites on the genitals or extremities. Several of the cases were operated upon under the mistaken diagnosis of perforating ulcer due to board-like rigidity of the abdomen. The victims of Black Widow spider bites become desperately ill and some die.

The apiarist also has his stings from the honey bee (*Apis mellifera*).

OCCUPATIONAL DISEASES AMONG CATTLE AND DAIRY MEN DUE TO ANIMAL INFECTIONS

One of the earliest skin lesions found on the hands of dairy maids was cowpox or vaccinia, which Edward Jenner observed. His studies led to his epoch-making work on vaccination for the prevention of smallpox.

Glanders, a highly infectious disease due to *Bacillus mallei*, found among horses, mules and asses, is frequently conveyed to man. The author has had 2 cases among farmers, 1 resulting fatally.

Anthrax, or malignant pustule, is occasionally found among shepherds, shearers and farm laborers. Out of 143 deaths tabulated by Andrews from 1910 to 1917 in U. S. Registration Area by occupation, 42 were ranchers and farmers. Actinomycosis, known as lumpy jaw in cattle, caused by the *Actinomyces bovis*, is occasionally transmitted to herders and dairy men and cattle men.

In California, coccidioidal granuloma, due to the *Coccidioides immitis*, closely resembling blastomyces, is a disease found primarily among farmers who contracted the infection in the course of their occupational duties. Tularemia is more common in rural districts, especially among farmers coming in contact with rabbits and the vectors that carry the infection. Tularemia must, therefore, be classified as an occupational disease.

R. T. Legge in 1921 investigated the abrasive action of figs on the cuticle of the operators picking and packing. The dermatitis of the fingers is undoubtedly due to the latex in the stems and skin of the fruit which possesses an enzyme having a proteolytic action on the skin.

Investigations by K. Meyer of the Hooper Foundation, University of California, San Francisco, in a botulism outbreak, revealed the fact that many cases of this disease were found among rural inhabitants who had eaten home-packed vegetables.

A form of eczema is observed among truck gardeners during the picking season of ripe tomatoes; it is also found in more pronounced form among peelers of tomatoes in canneries. It is believed that the irritating factor is the citric acid in the fruit, and can be relieved by dipping the hands in a mild alkaline solution.

During the past spring, when the daffodils were blooming, a farmer in San Mateo County complained of his pickers and packers having a dermatitis venenata, a rash with papules, vesicles, and at times pustules, due to an irritant probably in the sap of the flower stalks.

OCCUPATIONAL DISEASE AS A RESULT OF INSECTICIDES AND CHEMICAL POISONS

The horticulturist today, to secure good crops, is constantly waging war on enemies which bring disease and death to his trees, vines, and other forms of plant life. The various scales, mildew and fungus diseases, the bacteria, the destructive pests, such as flying and crawling insects, rodents and birds, require his utmost vigilance.

Among cattlemen in the Rocky Mountain states, Rocky Mountain spotted fever is quite common. The disease is transmitted by the *Dermacentor andersoni* (tick). The Supreme Court of Idaho, in 1932, upheld the Industrial Accident Board in its decision to grant an award to the beneficiaries of a man, who in the course of his employment was bitten by an infected tick and subsequently died.

Foot and mouth disease, or aphthous fever, a contagious disease found among pigs, cattle, sheep, and goats, due to an ultra-microscopic organism, is contracted by man, especially workers engaged in animal husbandry and dairy work. The commonest disease among milkers, dairymen and cattle raisers is undulant fever, found principally in dairy cattle, goats, and hogs. True Malta fever is due to the organism *Brucella melitensis*, and a similar disease in cattle and hogs to *Brucella abortus*. It has a mortality of 2 to 13 per cent. The only cases I have treated were among workers on dairy farms.

OCCUPATIONAL DISEASES AMONG FRUIT HANDLERS

H. Sutherland-Campbell brought to the attention of the profession the fact that parochia among orange workers is due to a fungus of the family Murovaceae. Workers are especially liable whose fingers come in contact with the pulp or juice of the orange, particularly that of culls.

L. B. Kingery and C. H. Thienes in 1925 found among fruit canners in the Pacific Northwest, a paronchia and dermatitis of the hands due to a mycelial infection. This disease has been called by the workers "fruit poisoning."

Poultry are infected with lice, sheep and livestock with mange and other parasitical infections. Creosol in some form is used as dips. Sheep dip, which is an arsenite of soda containing arsenic sulphide and free arsenious acid produces a characteristic rash on the exposed parts of the sheepman's body. Cases of perforations of the septum due to this irritant have been reported.

There are sprays intended for the destruction of chewing and boring insects and their larvae which contain principally arsenate of lead and Paris green. Kerosene and whale oil soap are used for insects that are destroyed by choking their respiratory apparatus. The scales and fungus diseases are checked by carbonate of copper, Bordeaux mixture, and nicotine. The fumigants are the deadly cyanide gas and sulphur. Occasionally a worker is accidentally poisoned, as was the case recently when cyanide fumigation was being used against a vine leaf pest in California.

In using arsenate of lead for effective spraying, there is the dual danger of either lead or arsenic poisoning. I recently observed the case of a horticulturist who had been spraying trees. Some of the spray had gotten on his face and hands, producing a typical arsenical dermatitis. Many workers develop scleroderma or warts during the spraying season.

Paris green is an arsenate of copper and is used extensively for spraying fruit trees, vines, and vegetables. It is responsible for producing typical arsenical symptoms, and causing skin irritation. Recently a case of amblyopia was reported in a young farmer who

was using nicotine in a spray for fruit pests.

Of the rodenticides, phosphorus, thallium sulphate, carbon bisulphide, and carbon monoxide gas are used. The records show many cases of poisoning and some deaths from the use of these toxic substances.

Several of the chemical agents used as weed killers produce dermatitis and are poisonous.

PREVENTIVE MEASURES

When consulting the Agricultural Index, one cannot help being impressed with the amount of research published annually on the various phases of agricultural activity and economics; dairying, animal husbandry, veterinary science, agronomy, and horticulture. However, virtually nothing is to be found pertaining to the farmer himself, his safety, and the prevention of his occupational diseases. The purpose of this paper is to point out the occupational hazards the agriculturist encounters daily, and their prevention by accepted methods. Every state board of health, workmen's compensation commission, state and agricultural college, farm advisory board, etc., should use its offices and bulletins to spread information concerning the methods by which the occupational hazards of the agriculturist may be decreased.

The man who knows the dangers he is likely to encounter, should study them just as the physician, who comes in contact with infectious diseases, is constantly on the alert to prevent them.

He should wear proper clothing, not only to protect his body from cold and heat, but proper boots to protect his feet from infection, gloves to protect his hands from chemicals and other agents that may produce dermatitis, and insulated hats to protect himself from heat stroke.

The various insecticides and rodenticides contain lead, arsenic, and nicotine, principally—all deadly poisons; and every one handling such agents must be warned of the effects they have on the human body. He should not only know the dangers, but the common antidotes and, in case of accident, what to do before the doctor arrives.

The sanitation of the farm is an important problem in rural public health procedure. It includes the control of malaria by established methods of mosquito control, of dysentery and diarrhea by preventing fly breeding through agencies to collect materials such as barnyard manure, garbage, and human wastes. Toilets with septic tanks avoid soil pollution from human wastes, and thus control hookworm. The prevention of accidents is accomplished by safety measures.

I have pointed out the occupational hazards of the agricultural industry and have presented the dangers that arise from accidents, diseases from farm animals and plant life and the hazards of chemical and physical agents used in agricultural pursuits. These hazards can be reduced fully two-thirds by the application of the measures used successfully by urban industrial concerns.

A School Health Program as an Educational Activity*

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DUE to the complexity of modern social existence there is an obligation placed upon the educational forces of the community to direct those factors that determine the limits of health of individuals. These forces must be studied not from the viewpoint of a school alone, but as a community problem, when attempting to alter the practices of a group. The social forces of the community should be utilized. More specifically, this can be stated by saying that the improvement of health of the school child must bring into play alteration in the home and utilization of the facilities of the physicians of the community.

At its inception the school health program started with environmental factors. The program had utilitarian aims entirely. Sanitation, ventilation, and fire hazards were the first problems to be considered. Then was added the attempt to control communicable diseases. This was a little more complex, involving problems of an individual nature as well as those of environment and sanitation. As the work of health in our school systems become more extensive, more and more of the personal elements were given greater consideration. Individual resistance to disease was considered—the presence of defects of structure or development in children was considered. Personal hygiene—eating, bathing, sleeping, waste elimination—all came to be considered as within the scope of a school health program.

This was as it should be, for with the advance of and the change in civilization and the mode of living, these personal problems became more important, not only to the individual but also to the community. Physical defects of children had to be corrected; individual resistance to disease had to be raised; a healthy efficient body structure had to be promoted.

The success of the health program in respect to improvement of the school plant and its environment was great. The technics used in bringing about these changes were successful. The school board appropriated money to make the improvements. The board of education supervised and demanded the alteration of old plants and the proper construction of new ones. Then, with the inclusion of newer items in the health program, the technic which had been so successful in the reduction of hazards, due to the faulty environmental factors, were very largely carried over. These technics of purchasing, demanding adherence to accepted specifications, alteration of existing faults by expenditure of public funds, were applied to the problems of purely personal health. The correction of visual defects, diseased teeth and tonsils, the immunization against certain diseases, the installation of bathing facilities, the establishment

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of school lunches, all were undertaken in a very extensive manner on a purchase basis.

There has been widespread realization of the inadequacy of this plan of trying to purchase personal health. Few, if any, of the old problems were completely solved. The buying of health for school children served merely as a stop gap. New methods of approach have been developed. These are educational in nature and involve exceedingly simple principles. First, there is the development of a realization as to what constitutes good health; second, of showing people how to use their own initiative and existing agencies so as to secure this good health. Something must be substituted for the attempt to improve personal health by purchasing it for the individual child. The objectives and technic of health education need to be altered.

The first objective of any constructive school health program should be teaching the pupils and the community what constitutes good health. Next, there should be held as an objective of health education the development of an appreciation of what constitutes proper health advice. In this day and age of uncontrolled advertising of false and even dangerous medical claims, the exercise of great care and judgment is required to select the true from the false. It may be more important, for the social well-being of a school child, for him to know that diabetes can only be controlled by the skilled care of a physician, and cannot be helped by some advertised nostrum, than it is for that person to know that the capital of Michigan is Lansing and not Detroit. This change in health education is accomplished only with difficulty among certain people. It has been such a short time since all medical care was a court of last appeal—the doctor was called in only when all else had failed. The educational forces of this country have not as yet taught people what constitutes proper health advice.

Another objective to be gained through the medium of health education in the schools is the establishment of a self-reliance in respect to securing health aid. The individual must be made familiar with and know how to make the most of the various remedial and prophylactic health forces of the community. It is not sufficient that the child have a physical defect removed or corrected by the school authorities. This is not education. This is repair, frequently instituted for the benefit of the school and not the child. That child must not be taught to lean upon the school nurse, physician, dentist, or nutritionist for health counsel, supervision, and treatment. It is the responsibility of the family to see to it that the child is placed in the best possible physical condition, not only so that he can secure the maximum from school, but also so that he can secure the most from all of life's experiences. By teaching the child and his family to rely completely upon the school health service staff for such things as physical examination, immunization, correction of dental defects, correction of any or all other physical ailments, that child and that family have been taught to rely upon a force that in but a very few years will be denied them. In this country no person can expect such medical and expert health care from the State after leaving school. The child and his family should be taught not only the need for medical care, but next they must be taught where and how to secure such care from the existing forces of the community. Without this latter part there will be no carry-over force to the teaching of the first part. The giving of this care by the school does nothing toward establishing a knowledge of the method of securing proper medical care. It does not educate and train a child to be a self-reliant citizen.

It tends to cause him to lean upon a force that suddenly is withdrawn when his school days are ended.

No satisfactory system has as yet been worked out in any country whereby the State can assume the responsibility in its entirety for the health practices and care of the people of that country. A division of authority must be made, separating those things which are the obligations of the State and those which are the obligations of the individual. The line of demarcation must be sharp, although from time to time changing circumstances must alter the location of the dividing line separating the one from the other. The school and educational systems, as the agents of the State, should see to it that those things over which the individual can, by the very nature of things, have no control are adequately supervised. There is that group of things over which the State has only part control and the individual has part. There must not be usurpation of authority by either the State or the individual in this category of activities. Then, there are those medical problems that are entirely individual and personal. It is but the duty of the school to educate the child in this respect and not actually to practise medicine.

The minimal staff to carry on the needs of the school system in respect to its physical health program must consist of persons trained in various lines. First, there is the physician with his agent, the nurse. Then, there is the teacher. The teacher is the most important of all in actually conducting the program. It is her duty to translate to the children and the community the principles of health as laid down by the school physician.

In considering the duties of the teacher we should rather think of the opportunities. Teaching of health is not and cannot be the rôle of any one person. No one teacher can conduct a course in health and feel that this is all that there is to the problem. Health teaching must be integrated with all possible phases of school and community activity. In our schools it must be woven throughout the entire fabric of the plan of education. Every teacher must play a part. The first thing that should be done is to acquaint each teacher with each child under her supervision. Each teacher should know the limitations and potentialities of each of her children. She must be intimately acquainted with their physical defects. She may acquire this information in several ways—through being informed of them by the nurse; through watching a physician make the health examination; or, what seems the most satisfactory, through actually inspecting each child herself. The experience gained and the appreciation of the individual child's problems are so much greater if the teacher actually discovers them herself. The more the teacher recognizes these things in individual children, the more will health work become a living, vital force in moulding her method of handling the individual child. So, too, the more the teacher knows about these things, and the more she is able to do in taking part in a general health program, the more she can do to secure and further the correction of the existing physical defects of the group. If a teacher inspects the mouths of 100 children and finds that 75 or more of them are badly in need of dental care, there must be forced upon her a realization of the inadequacy of the existing dental program of the community.

It is not the duty of the teacher to diagnose and prescribe for physical defects. All she can do is teach the child and the community what constitutes good health and the method for securing improvement. In this she should be aided by the physician of the school.

It is not the duty of the school physician to diagnose and treat these same physical defects, for his rôle while in

the school must be one of education along the lines for which his special training best fits him. It is his duty to point out the way to correct and prevent. Frequently this is a much harder task than it would be to correct the fault, but he must at all times remember that he is but a part of the educational program dealing with the teaching of an entire community in the methods of appreciating, securing, and holding good health.

Treatment of the existing pathological condition is essential, but treatment in itself is not striking at the root of the evil. No child comes to school with a fault of physical structure or of health practice because that child wishes to have such a defect. It is present because there is a more fundamental fault. The parents and family are ignorant of one or more of several things. First, they may not know of the presence of or the significance of the defect. This is in itself of serious implication. It means that this family is lacking in the first fundamental of health education—they do not know what constitutes good health.

If the family is aware of the defect and still does nothing about it, once more the trouble is a correctable deficiency on the part of the family. They do not know how to secure the indicated medical or dental attention, the importance of such care, or how to utilize the existing corrective health forces of the community. Poverty is seldom, if ever, a valid excuse. In most communities there are welfare and relief agencies ready and willing to give care to those who are unable to secure it through other channels. If there are no such agencies operating, then again there is a fault of education of the community that is of far greater import than the mere presence of the uncorrected physical defects in school children. Here is opportunity for the school health workers to line up the existing forces and agencies of the community to organize such corrective and treatment clinics as the welfare of that community demands. Affording treatment to the school child within the schools or by the school agencies, under such circumstances, is an extremely short-sighted public health policy, ignoring the needs of the other four-fifths of the community's population.

In following out a policy of education of the parents and the community both to provide and seek remedial treatment, the school health forces are working on a far-sighted plan. There is a carry-over value in this plan. If a mother is taught the importance of disease and is provided with both the incentive and the means of securing a correction for one school child it is not too much to hope that same parent will afford the same care for the younger children of the family; nor is it too much to expect that other parents will likewise learn how to secure medical aid for their children. The oncoming children will enter school in just that much better condition.

The ultimate in good care for children can come from having all the medical forces of a community utilized to their fullest in correcting and preventing defects of the children. The family and the child should be taught to go to a physician not only for correction and treatment of existing conditions, but they should be so guided that they will go to them for the periodic examination. The resources of the school should be reserved for the detection of defects in the children of parents who have not as yet learned to follow this practice. The child who is under the constant supervision of a private physician is not in need of examination and diagnosis by the school teacher, nurse, or physician, providing, of course, that there has been developed a satisfactory system of notification of the school of the uncorrected defects that

are apt to interfere with or call for a modification in the school curriculum.

The school physician should see to it that the medical forces of the community are organized and prepared to care for this assignment. The private physicians should be able to examine in a satisfactory and complete manner all children who present themselves. This service should be available at a price within the means of every family. It is not implied that a low or no fee should be charged, but it is essential that different arrangements be made to care for the different economic groups. Care should be consistent with and of a type that is available to that group at all times. There is no sense in sending the chronic pauper to the offices of the exclusive specialist for an examination if his family cannot call upon that same specialist for its medical care at all times. Attempting to do this causes unrest and dissatisfaction on the part of the patient and the physician. An arrangement must be worked out that will serve all members of that family at all times. The completion of such arrangements must, if need be, be carried out by the school physician and his staff. It is serving the school child to the greatest extent to see to it that medical care and attention are at all times available for all members of the school child's family. Picking out one or more members of that family for 9 or 10 months of the year for a few years of life is a most short-sighted policy. Let the schools educate the people as to the needs of medical care and the means of securing it; let them elicit and develop a sense of responsibility for health on the part of the family; let them prepare the medical profession to assume its obligation; and then most of the problems of school health will be solved in a permanent manner.

One of the greatest aids in securing the assistance of the group of practising physicians of the community is to acquaint each physician with the school, its plant, teachers, curriculum, and aims. A concerted effort is necessary to accomplish this. Every physician of the community should be acquainted with these things, and it would be far better if every physician were allowed to take an active part in the health service of the school system. This participation should, of course, be under the instruction and guidance of the specially trained school physician. Just as it works to the advantage of the school child's health to have the teacher play an ever increasing rôle in the detection of defects and in the education of parents in the need for correction, so, too, does it act beneficially to have the practising physicians of the community play a similar part. They should become acquainted with the school child, his physical health problems, and the facilities of the school to care for and meet these problems.

The school health service caring for the control of communicable diseases is identical in its set-up with that for the control and correction of physical defects. Again, the teacher, nurse, and doctor must all play their parts. No one can do his share without the full coöperation of the others. Again, the educational factor is of the greatest importance. The program starts with the teacher and her activities. The teacher inspection of children is the start. But this inspection as a formal, comprehensive, searching program must be carried on in the home and not in the school. The teacher inspection should serve as a check on that of the parents. It should be a device detecting the failures on the part of the parents. Parents should not be taught to send their children to school in order to find out what is wrong with them, nor should parents be taught to assume that the school will take the responsibility of picking out those with communicable

diseases. If a child with a communicable disease is sent to school there is bound to be exposure of others. Parents must be taught how to detect signs of illness. When a parent fails in his duty and responsibility, a duty to his own child and a responsibility to the entire community, then the teacher should be in a position to detect this failure at once. This means that the teacher too has to conduct a second inspection. Having detected a child ill with symptoms of a communicable disease, but part of the task is done. The fault that lies back of this child's coming to school, endangering his own and the health of others, must be corrected. That can be done only in the home. That child should be taken home by the nurse and a full explanation given to the parents of what has happened and the danger resulting. The nurse because of her special training in this respect is in a position to instruct the mother as to the signs and symptoms of communicable diseases.

Immunization against smallpox and diphtheria, and at times and in certain localities against scarlet fever and typhoid, should have the same underlying philosophy as the routine program for the control of communicable disease. The vaccination of a child, the injection of toxoid, and other prophylactic medical practices, are not primary functions of a board of education. They have little or no educational implication in themselves. As all too frequently conducted, they tend to tear down the laboriously built up teaching of self reliance. When diphtheria immunization is done in school and as a school project it should be conducted as a supplement to a general community health program, and every child that has to be immunized in school should be looked upon as a failure in the general health education program. Steps should then be taken to correct and lessen these failures. This same thought should apply to all other prophylactic practices that are carried on within the confines of the school.

A school health program conducted as an isolated bit of effort is doomed to failure. A successful school health program must be built around the full life of the school child. It must have as active participants not only the school doctor, nurse, and teacher, but also the parents, the physicians of the community, the social and welfare agencies, and all other forces that can influence the physical well-being of the entire community. The pupils should have a series of experiences of real learning, situations which can give them and their families an opportunity to plan their own solutions for the present and future problems.

Application of the Neufeld Reaction to the Identification of Types of Pneumococci*

With the Use of Antisera for Thirty-Two Types

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As clinical results show that success in the treatment of pneumococcic pneumonia cases with specific antisera is dependent to a large degree on the early administration of the serum, the rapid identification of the infecting organism by a reliable method is of great importance. Neufeld [1] in 1902 reported that the capsules of pneumococci in contact with specific antiserum become swollen and more distinct in outline and develop a ground-glass appearance. In 1931, Neufeld and Etinger-Tulczynska [2] identified types of pneumococci in mixed cultures by this reaction and stated that antisera prepared in rabbits rather than in horses should be used. Armstrong,[3] and Logan and Smeall [4] in 1932, independently, reported that the reaction could be applied practically to the determination of the type of pneumococcus directly in sputum. Etinger-Tulczynska,[5] in 1933, in a detailed study of the reaction, noted that antisera produced in rabbits caused the formation of broader, more strongly refractive layers around the cocci than the antisera produced in horses. The precipitates formed by mixtures of pneumococcic soluble specific substance with horse and with rabbit antiserum differed when examined microscopically; that with horse antiserum appeared as granular heaps and that with rabbit antiserum as glistening drops and flakes.

Sabin (1933)[6] made a practical application of the Neufeld reaction to the diagnosis of 100 cases of lobar pneumonia. With Type I and Type II antisera (rabbit) he was able to identify Type I or Type II in 53 cases and obtained no reaction in 47 cases which were subsequently shown to be caused by other types.

Beckler and MacLeod (1934)[7] have examined 760 specimens using antisera for Types I to XXXII with an error estimated to be not over 1 to 2 per cent.

Notwithstanding the reports of others that horse antiserum was unsatisfactory, we made a trial of refined antisera which had been prepared from high grade horse antisera by concentration to one-tenth its former volume. The layers produced about the cocci were as broad as, or broader than, those formed in rabbit antisera. However, with both concentrated and unconcentrated horse antisera, the swollen capsules were less refractive than those formed in rabbit

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antiserum. Furthermore, the antisera produced in horses generally gave considerable cross-reactions and consequently were unreliable. We find in many cases the characteristic appearance of the capsule in contact with its specific rabbit antiserum more dependable than mere increase in the size of the capsule.

Antisera produced in rabbits, with a very few exceptions, were highly specific when precautions were observed to avoid the injection of any considerable amount of autolysate and of any trace of soluble specific substance of other types.

The method of producing antisera as developed and carried out by Miss Rosenstein in this laboratory is given here in full because of the many requests which we have had for details.

Pneumococci are transplanted from stock cultures in beef heart phosphate (0.2%) broth containing 3 per cent citrated horse blood into tubes containing beef heart phosphate broth without blood and are incubated about 24 hours. From these preliminary cultures, transplants are made into bottles of beef heart phosphate broth for the antigens to be used for injection.

These cultures are incubated 18 hours. They are then centrifugalized and the sediment taken up in a solution of 0.5 per cent formalin in salt solution in such an amount that the sediment from 10 c.c. of culture is contained in 1 c.c. of suspension. The vaccine is held at room temperature for 4 to 5 hours to aid in killing the organisms, and then is stored in the icebox until used. Sufficient vaccine for the series of injections is prepared at one time.

Injections of rabbits are given intravenously on 3 consecutive days followed by 4 days of rest. A normal bleeding is made immediately before the first injection. The quantities injected the 1st week are: sediment from 2½ c.c. culture (0.25 c.c. vaccine), sediment from 5 c.c. culture (0.5 c.c. vaccine), and sediment from 10 c.c. culture (1 c.c. vaccine). Beginning with the 2nd week, the sediment from 10 c.c. (1 c.c. vaccine) is injected each time.

When it seems advisable, trial bleedings are made on the 3rd day after the last day of the injection series in order that the schedule may not be interrupted if the titer of the serum proves too low. The first trial bleeding is made after the fourth series of injections (the twelfth injection).

The minimum titer requirement which we have adopted for a serum is that it shall strongly agglutinate the strain with which it was prepared in a dilution at least of 1–200.

Agglutination titrations are carried out with equal parts of serum dilutions and formalized antigen or 18 hour live cultures diluted to make thin suspensions of approximately uniform opacity, which are mixed and are incubated 2 hours at 55° C. The agglutination reactions are read. Tests are placed in icebox overnight and again read.

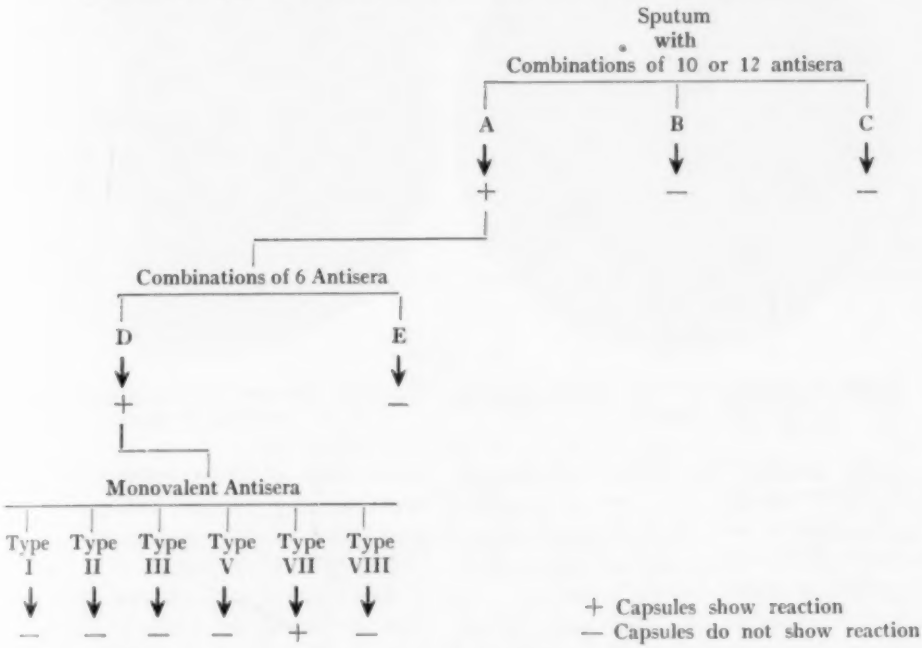
Rabbits are bled on the 6th to 10th day after the last injection.

Each antiserum is tested to determine its ability to cause a characteristic swelling of pneumococci of the homologous type and its freedom from cross-reactions.

Very bad cross-reactions result from the indiscriminate use of syringes. It is important, therefore, to reserve a separate syringe for each type for the period of immunization. Before a syringe is used for injections of another type it should be thoroughly scoured and cleaned. Through a failure of one of our workers to appreciate the importance of special care, a number of antisera were made, in the preparation of which syringes which had not been specially treated to remove all traces of the vaccines previously injected were interchanged from day to day. The syringes were rinsed by drawing water in and out and were sterilized. The antisera prepared at this time reacted so strongly upon the heterologous type strains which were being used for injection at the same time that in one or two instances the type for which the antiserum was prepared could be determined only from the records. A similar experience with like results was related to us as having occurred in another laboratory. It seems probable that some of the failures to secure reciprocally specific antisera for Types I and II from rabbits which have been reported to us may be explained in this way. It appears that a very small amount of antigenic sub-

TABLE I

EXAMPLE OF AN APPLICATION OF THE NEUFELD REACTION TO THE IDENTIFICATION OF THE TYPE OF PNEUMOCOCCUS IN SPUTUM WITH THE USE OF COMBINATIONS OF ANTISERA



Diagnosis—Type VII pneumococci

stance may stimulate the production of antibodies sufficiently to cause marked reactions.

Some difficulty was encountered in the production of Type III antisera which would be free of reaction on Type VIII strains. Certain Type III strains are especially active in stimulating the production of such cross-reacting sera. The old Type III "R3" stock strain which we use seems to be more than ordinarily free from this quality. Where immunization was continued longer than usual, even with this strain some of the antisera produced reacted somewhat on Type VIII strains. Highly specific antisera can be prepared and only such should be employed.

Representative strains of Types I to XXXII were found to react in a satisfactory manner with their homologous antisera.

With a view to decreasing the labor involved in the use of so many monovalent antisera in separate tests, combinations of 5 or 6, or of 10 or 12 different antisera were tried. At first, we tried the combinations in amounts similar to the monovalent antisera and obtained a fair percentage of positive results, but failed to identify the type in several sputa which were loaded with pneumococci. These sputa were subsequently found to give very definite reactions with homologous monovalent antisera. When relatively larger quantities of the combinations were then tried with these sputa, it was found that the greater the proportion of serum, the more marked were the reactions. It is probable that when large amounts of soluble specific substance from disintegrated pneumococci are in the sputum, antibodies are neutralized so that where only relatively

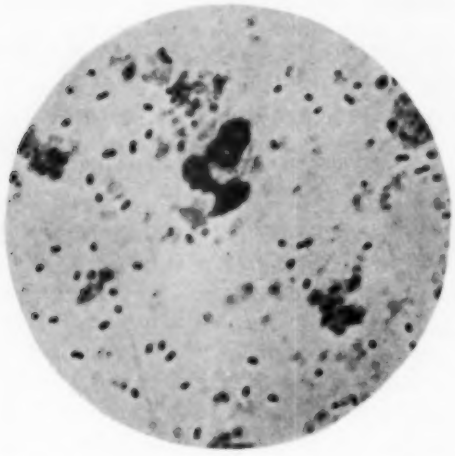


CHART I—Pneumococci with normal capsules. No reaction.

CHART II—Pneumococci with capsules swollen. Positive reaction.

small amounts are present, insufficient antibody remains to cause a recognizable reaction with the individual organisms. With monovalent antisera a proportion of about 4 parts antiserum to 1 part of sputum, or other pathological material, generally gave satisfactory results; with combinations of sera, however, to obtain equally satisfactory results, a relatively greater amount, about in proportion to the number of antisera combined, *i.e.*, 20 to 40 times as much serum as sputum, was necessary. Satisfactory results can be obtained with pneumococci in cultures and in peritoneal washings of mice if a sufficiently large proportion of antiserum is employed.

Although, without question, where serum therapy is to be used, the examination for the type should be made at the earliest possible moment, the contention that "sputum should be typed not later than 2 hours after it is coughed up," is not valid. We found that the type could be determined in a majority of sputa considerably older than this. Specimens after storage in the icebox for over 2 weeks gave positive results. Sputa kept at room temperature gave unsatisfactory results because of the overgrowth of other organisms.

The results [8] reported at a meeting of the Society of American Bacteriologists in December, 1933, of the examination of a group of unselected sputa from 110 patients made 6 to 48 hours after collection illustrate the degree of success that is possible with such material. Positive findings were made in 84, *i.e.*, 76 per cent, and negative findings in 28 cases, 24 per cent. Of the latter, 6 were from respiratory conditions other than pneumonia. Of the 22 negative sputa from lobar pneumonia cases 7 were from patients 1 to 8 days after the crisis, and 5 had received serum treatment which may have influenced the results. No explanation for the negative findings in the other 10 is available, as the examinations were not repeated since they had been made, not with the object of making a diagnosis, but as a means of investigating the activity of certain sera.

We have found the following technic for carrying out the test satisfactory:

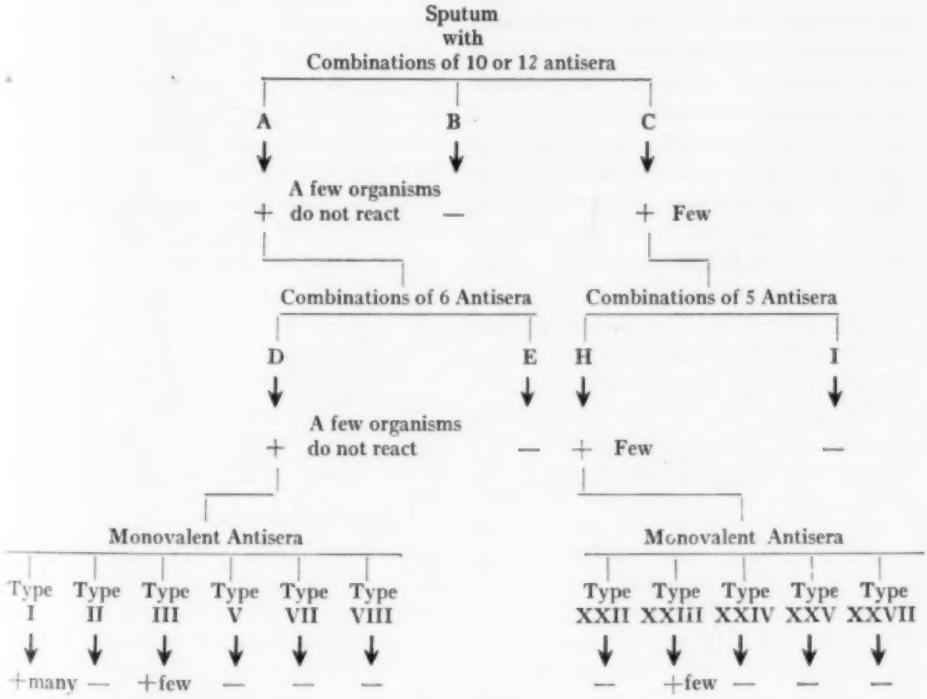
With a tiny loop or a straight wire place

a very small amount of material on a cover glass, mix with 4 to 40 times the amount of serum as required and a standard loopful (0.01 c.c.) of Loeffler's methylene blue. Seal on a hollow-ground slide with cedar oil, place a drop of oil on the cover glass and examine with the oil immersion lens. Inverting the slides with the ends on side rests, and cover glasses down for a short time before examination seems to facilitate the examination, especially when the specimen is thin. The heavier elements, including the pneumococci, settle on the cover glass and may be more easily examined. A fairly good miscroscope is necessary and a powerful microscope light is a great aid. When only ordinary light is available the drops may be placed on flat slides and covered with cover glasses. When the organisms are few they are somewhat more difficult to find in thin preparations.

The procedure is to observe the reactions with 3 combinations of 10 to 12 antisera among which Types I to XXXII are divided. If there is a reaction in one of the combinations, tests are carried out with 2 combinations each containing 5 or 6 of the antisera included in the combination with which the reaction was obtained. Finally tests are made with the individual mem-

TABLE II

EXAMPLE OF AN APPLICATION OF THE NEUFELD REACTION TO THE IDENTIFICATION OF THE TYPES OF PNEUMOCOCCI IN SPUTUM WHEN MORE THAN ONE TYPE IS PRESENT WITH THE USE OF COMBINATIONS OF ANTISERA



+ Capsules show reaction
— Capsules do not show reaction

Diagnosis—Type I predominates. Types III and XXIII found in small numbers. Infecting agent probably Type I. It may be a mixed infection but the common occurrence of Types III and XXIII in the mouths of normal individuals makes this conclusion doubtful without further proof.

bers of the combination or combinations with which reactions were obtained. By this procedure, the type of pneumococcus, or if more than one type is present, the types of pneumococci, may be identified. If it is probable that only one type of pneumococcus is present, as for example in a spinal fluid from a case of pneumococcic meningitis, when a reaction has been obtained, examinations of other combinations or antisera may be omitted. This procedure may also be followed in the examination of sputa from pneumonia cases when all the pneumococcus-like organisms appear to react. We find that the examination of such specimens can be completed in less than an hour.

Type determination by the Neufeld reaction seems to be the most rapid and reliable method which has been devised. It has the advantage that it can be applied wherever suitable microscopic means are available, without other, more cumbersome, laboratory equipment. It has the further advantage that the approximate number of pneumococci present can be estimated, which is of some diagnostic and prognostic value. The identification of the organisms actually present in the sputum is more reliable than any method in which mice are employed, because, in mice, there is always danger that certain mouth pneumococci, which are more virulent for the mouse, may overgrow the infecting type of the case.

SUMMARY AND CONCLUSIONS

Capsules of pneumococci of Types I to XXXII are specifically reacted upon by homologous type specific antisera (rabbit).

Time and labor are lessened by making preliminary tests with combinations of the antisera.

Success with materials of different kinds containing pneumococci depends on making the tests with a relatively very small proportion of the material to a large proportion of the antiserum.

With care, suitable type specific antisera can be produced in rabbits.

Some lots of Type III antiserum notwithstanding special precautions in their preparation may react on type VIII pneumococci, therefore each lot should be tested for its specificity.

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Generalized Public Health Nursing Service in Cities*

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IN the recently published *Survey of Public Health Nursing* by the National Organization for Public Health Nursing, evaluation has been made of the performance of public health nurses based upon a sampling of services throughout the country. This searching probe of accomplishments and shortcomings gives substantiating evidence of present public health nursing practices and their effectiveness in meeting community needs. Certain conclusions are presented from a study of 39 agencies which may have a direct bearing on future plans for the public health nurses' part in a community program for the prevention and control of syphilis.

The survey's analysis of home visits included 7 types of services; marked difference in the quality of performance was revealed. The service designated as "Disease Prevention, including Syphilis and Gonorrhea Control" ranks fifth in the list. Only 13 out of the 39 agencies surveyed "render supervision to some extent," to cases of syphilis. As in other related services in the community, such as hospitals, laboratories, clinics, and social agencies, public health nursing facilities are also inadequate in dealing with this gigantic problem with forcefulness and vigor. This is especially striking in view of the widespread prevalence of this disease and the knowledge possessed regarding its prevention, permanent arrest, and cure.

What are the difficulties in its control? How can the administration and practice of public health nursing services be made more effective with respect to this pressing public health problem? A clue to the answer to these questions may be found in this survey which indicates those factors in the performance of public health nursing which might be used as a foundation upon which to build and expand the public health nursing activities in a social hygiene program.

It is a noteworthy fact that the prenatal visit ranks first in the list according to quality of performance. This is of particular interest since the general conclusions of the survey state that the home visits in which health supervision and teaching form a major part rank lower than services in which bedside care is given. Yet the prenatal visit is primarily educational. The rôle of the nurse when making home visits for the control of syphilis is certainly that of teacher, yet these visits rank fifth. It is not difficult to find the reason for this apparent anomaly. Studies, demonstrations, and opportunity for research over a period of years have made available definite knowledge regarding the content and

* Read at a Joint Session of the American Social Hygiene Association and the Public Health Nursing Section of the American Public Health Association at the Sixty-third Annual Meeting in Pasadena, Calif., September 3, 1935.

method of the prenatal home visit. The Maternity Center Association has offered supervised field experience and has published briefs and outlines, both for use in the home visit and for group instruction. Other material from the Children's Bureau and from insurance companies has made possible the distribution of current and specific information regarding the procedures and technics in prenatal care, both in urban and remote rural areas. Supervisors with special maternity experience and training are more frequently a part of the supervisory staffs of public health nursing agencies than for other types of services.

A similar plan of study needs to be undertaken to gain more specific knowledge regarding the program and performance of the public health nurse in venereal disease services. It is obvious that education in the medical and nursing facts of syphilis is a necessary prerequisite for intelligent participation and for a high quality of performance. The *Survey of Public Health Nursing* states that only about 7 per cent of the nurses from whom information was obtained had completed an accredited curriculum in public health nursing. Thus, outlines and briefs (perhaps a summary of Gladys L. Crain's articles published in the *Public Health Nursing Magazine*) should be made available to assist the nurse in enlarging her content and improving her teaching. Statements covering the technic of the interview, the attitude and administration of the clinic need to be included. Opportunities for field practice under the direction of specialized supervisors, and theoretical instruction through extension courses would be of great practical aid in improving the quality of this service. Constant good teaching, in the home and in the clinic, not just "telling," will overcome many of the difficulties entailed in case finding and case holding activities.

A second factor brought out in the Survey showing possibilities for future development in this program, is provided by the criteria upon which ratings are based. Approach ranks first. The importance of this as an asset in communicable disease control cannot be overestimated. Many authorities state that the immediate problem is the prevention of the further spread of infection. To accomplish this the coöperation of the patient is essential—gained through an attitude of consideration in the clinic and an understanding of the social factors involved; through the nurse's tactful and skillful home visit influencing the patient and family to assume their share of the responsibility for the successful termination of the long period of treatment. The good approach is a big element in bringing this about. The Survey defines approach as: "implying those intangible qualities of relationship with people which makes for a good or poor contact." Upon the nurse's approach often depends the finding of sources of infection and contacts who must be persuaded to seek medical advice, early diagnosis and treatment if needed. Since "approach" was universally found to rank high and is of such importance in the work, it would seem that public health nurses can contribute effectively to community programs for controlling syphilis and assist in adjusting the social and economic conditions causing their spread.

C.-E. A. Winslow, in his book, *A City Set on a Hill*, in the chapter on Venereal Disease, says: "The most important development in the venereal clinic during the demonstration period has been in the employment of two nurses for social service follow-up of cases."

Given better qualified and more proficient personnel, current authoritative manuals of instruction, supervisors with special preparation, opportunity for continued staff education through insti-

tutes and study courses—all these though of primary importance are still only part of a plan for the development of more effective case finding and case holding activities. Equally important is the type of administration.

Public health nursing services require efficient administrative direction, including adequate financing and coördinated and unified community relationships. To achieve this, a generalized nursing program is most suitable, consisting of several types of nursing services administered by one agency, each nurse giving all these types of service to families under her care. Again quoting from the Survey:

> Since the goal in public health nursing, as in many services essential to the well-being of the population as a whole, is a comprehensive community program, the Committee strongly recommends that all public health nursing be carried by as few agencies as possible. Through a combination of agencies, as is self-evident and as has already been demonstrated, a service of a more uniformly high quality can be rendered in a community with provision for a more effective program of supervision and staff education, with less expenditure of money than when there are many independent services. The Survey shows beyond a shadow of a doubt that such provision is one of the greatest needs of the present moment.

A generalized public health nursing service would be of great administrative advantage in the problems associated with case finding and case holding. In setting up a plan to meet this community need and make it most productive, the nursing agency must take part in coöperative study, through representation on the Community Social Hygiene Council, together with representatives of official and nonofficial agencies. In such a council, programs are studied and plans made so that contributions of the agencies and the professions may be most effective. These programs are based upon current information and knowledge of the extent and cost of venereal disease, upon knowledge of activities of organizations directed against them, upon a record of facilities for their diagnosis, treatment, and after-care, and upon methods of "quacks" to trap the credulous. Such centralized direction, under leadership of the health department, facilitates coördination and integration of medical and nursing services and more nearly approximates the production of a maximum service with a minimum of waste.

Syphilis is essentially a problem of the whole family and the modern definition of public health nursing, whatever the program, is based on its relation to the individual as a part of the family and of the community.

The public health nurse is well known to many families in her district. Her maternity program includes the supervision of the pregnant woman. The possibilities of eradicating congenital syphilis through treatment early in pregnancy is a challenging problem in which the private physician, the clinic, and the nurse unite forces. Other types of home visits offer equal opportunity to change the attitude of the family toward syphilis, so that delinquent clinic patients, wrong addresses, fictitious names, will not be the rule, but instead a coöperative and responsible attitude on the part of the family, the attainment of which is so gratifying when working toward the prevention of other communicable diseases.

An example illustrative of such family coöperation occurred during the recent poliomyelitis epidemic. Two young girls had, after months of planning, arrived at a girls' camp. The day after they left home their mother ascertained that a child, with whom they had been to a party the evening previous to their departure, had developed poliomyelitis. She notified the clinic doctor and the camp director and the children were brought home and isolated.

Venereal disease, of course, presents more difficult problems, in many ways,

than other communicable diseases. It is more difficult to persuade people to the same reasonableness of attitude regarding diagnosis and treatment as has been developed toward tuberculosis. But a technic adequate for social and medical ends is being developed. The greater use of the generalized public health nursing agency by physicians and clinics as an economical and effective channel through which the weak spot—in the control of syphilis, namely the finding and holding of cases—can be strengthened. The rôle of the adequately prepared and supervised public health nurse as the interpreter of scientific knowledge in performing family health service under the direction of a generalized public health nursing agency should be of great assistance toward attaining the goals of preventive medicine and public health.

Deficient Hospital Service

THIRTY-ONE million persons in the United States live in areas which are seriously deficient in hospital and health services according to a nation-wide study made by Alden B. Mills, managing editor of *The Modern Hospital,* and formerly executive secretary of the Committee on the Costs of Medical Care.

About 1,300 of the 3,073 counties in the United States have no general hospitals. Some do not need general hospitals since they are or can be served by hospitals in adjacent counties if the distance is not greater than 50 miles. Consequently in this study the United States is divided into areas with approximately 50 miles radii.

After careful study of all factors involved it was decided that rural populations require a minimum of 2 hospital beds per 1,000 population, although the study does not recommend or consider practical the building of general hospitals of less than 25 beds. For smaller areas it is suggested that " cottage hospitals " or central medical service offices be established.

There are 31,000,000 people and 29,000 physicians in areas that contain less than 2 hospital beds per 1,000 population and are more than 50 miles from a hospital center; there are 1,117,915 persons and 896 physicians in areas that have less than one-fourth of this ratio (0.5 hospital beds per 1,000 population), that there are 147 such 100 mile areas in the United States which have fewer than 2 hospital beds per 1,000 population and that there is an actual need of 22,000 additional hospital beds in these 147 areas if minimum standards are to be met.

W. S. Rankin, M.D., F.A.P.H.A., of the Duke Endowment, says that the community without hospital facilities has ceased to attract the young, well prepared physician, and that, if he is forced to locate in such a rural area, he stays no longer than necessary to enable him to move to a community providing hospital facilities and congenial professional surroundings. Herein lies the principal cause of the relative scarcity of physicians in rural communities.—*The Modern Hospital,* Mar., 1935.

Formation of Sanitary Districts in Recreation Areas*

W. W. CHANDLER

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SANITATION, sewage disposal, and garbage disposal in recreation areas in California constitute a problem which is largely unsolved; yet, upon its proper solution rests the future and the safety of these areas.

Regulation and control have been left principally to the counties in which these recreation areas exist and in part to the Federal Forestry Service where the recreation areas lie within national forests.

County ordinances covering rural sewage disposal are not always applicable because they do not take into account the type of soil structure and drainage common to the recreation area. Sewage disposal facilities which would be safe and entirely adequate in one place may be a menace to health in an area where the soil is shale and gravel and the terrain is precipitous. Although chemical toilets are necessary in some locations, the owners find them inconvenient and expensive to maintain. In some selected locations we have found that contamination can be prevented by the construction of septic tanks of proper capacity, made of concrete, with the effluent passed through a sand filter. Such alternatives as this are seldom provided for in our rural sanitation regulations. Few if any of these general ordinances deal with garbage and waste disposal, the enforcement of safe building, plumbing, and wiring regulations to reduce the fire hazard.

After careful study, we have concluded that the interests of the areas will be best served by the formation of sanitary districts within these recreation areas. In our county, one of these districts is now in process of formation, and others are soon to follow. We feel that a local district can best deal with the sanitary problems of the area, as soil conditions and terrain differ from one recreation area to another.

Ordinances passed by the sanitary board have the force and effect of law. If the character of one area permits the use of a septic tank with sand filter, and that of another requires chemical toilets, such differences can be provided for by the respective boards.

In addition the sanitary board can, through housing, plumbing, and wiring ordinances, control the housing conditions and, to a marked degree, the safety of the area. With a sanitary district functioning, it will no longer be possible for ramshackle, unsafe, and disreputable looking houses to be built, depreciating the value of better properties beside them and increasing the fire hazard by unsafe and illegal wiring. The danger of such wiring was brought to our attention forcibly by the recent

* Read at a Joint Session of the California Association of Sanitarians and the Public Health Engineering Section of the American Public Health Association at the Sixty-third Annual Meeting in Pasadena, Calif., September 4, 1934.

disastrous fire in the Arroyo Seco above Pasadena.

A sanitary district can, at small expense, provide for the proper disposal of garbage and waste (cans, etc.) at regular intervals. Throughout California we have witnessed the progressive spoiling of our recreation areas with improperly disposed garbage, old cans, papers, etc. Add to this the danger to public health from the breeding of flies and mosquitoes in garbage and old cans. In addition, open and improperly disposed of garbage is a lure to rats, mice, and ground squirrels, serving to increase their numbers materially and attract them to the recreation areas. This, in turn, increases the possibility of outbreaks of bubonic plague and relapsing fever, which are already endemic in our rat and ground squirrel population.

A sanitary district can materially aid in the beautifying of its area by passing an ordinance requiring the coralling and fencing of all domestic animals which are now permitted to wander about, destroying flowers and plants. The saving in the cost of fencing properties alone would pay the cost of this for many years. Still another advantage of a sanitary district is that it would be legally organized to enter into contracts with the federal government for the development and maintenance of water supplies and in this regard, would exercise the function of a water district with the additional functions of general sanitation, garbage and sewage disposal, and housing regulations.

And now for the cost—We feel that the disposal of garbage, cans, and trash can be taken care of very cheaply. The rate is low by virtue of the fact that in the neighborhood of most areas there is a man who owns a truck and will haul and dispose of the garbage and refuse for about $50 a month or less. I feel certain that there are few districts which cannot find a responsible neighborhood rancher who will be glad to get the work.

The inspections are and will continue to be the function of the county health department.

SUMMARY

California has not developed an adequate technic to regulate sanitation, garbage, and waste disposal, building construction, plumbing, and wiring in the recreation areas of the state.

General rural sanitation regulations are largely inapplicable to recreation areas where unusual soil and topographical conditions exist.

The formation of sanitary districts in these areas appears to be the most practical, all-inclusive, low cost solution of the problem.

Public Health Degrees Granted in 1934

THE Committee on Professional Education of the A.P.H.A. has compiled a list of colleges and universities in the United States and Canada which grant degrees in public health. The March issue of the *Journal* carried a report on the number of degrees granted in 1934, as well as a comparison of 1932, 1933, and 1934 figures. Reprints are available free, and may be had on request to the Executive Office.

The Vitamin B Adventure

R. R. Williams

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THE study of vitamin B which I have been privileged to pursue since 1910, has been preëminently a co-operative enterprise. Nearly 40 years of effort by scores of workers in many lands have furnished its foundation, and the early precedent of collaborative effort has been followed in our recent work.

The major task in defining the structure of the vitamin was getting enough vitamin for study. In this part of the work, much of which was done in The Chemical Engineering Laboratory through Dr. Jackson's kindness, the aid of Mr. Waterman and Dr. Kereszteszy was indispensable, not only because of their resourcefulness but because of their stamina under seemingly endless disappointments. Miss Ammerman's skill in guiding the work by means of curative tests on polyneuritic rats was equally important.

We have produced about 12 gm. of vitamin crystals, of which 4 or 5 gm. have been used for structure work. Vastly more material would have been required some years ago before Pregl's micro-analytical methods were developed. These were applied very successfully to our problem under the supervision of Dr. Oskar Wintersteiner of the Columbia Medical School, New York.

A disaster of earlier years was turned to account in approaching the study of structure, for sulphur dioxide which destroyed the vitamin where it was used as a preservative for rice polish extracts, proved a tool for neatly splitting the vitamin molecule into two pieces without producing any chips. The reactivity of the sulphur in the vitamin led Dr. H. T. Clarke of the College of Physicians and Surgeons, who has specialized in the field of organic sulphur compounds, to suggest the presence of a thiazole ring, or nucleus in it. The absorption of ultra-violet light by one of the pieces of the vitamin, obtained by sulphur dioxide splitting, was found to resemble very closely that of a synthetic thiazole. A little further work served to confirm Dr. Clarke's suggestion. This is the first time a thiazole ring has been found in nature and it is not difficult to imagine that its discovery may ultimately prove more important to biochemistry than the structure of the vitamin itself.

We have made unusual use of ultra-violet light absorption in this study, for the pyrimidine nucleus in the other piece of the vitamin was confirmed also by this means as applied by A. E. Ruehle of the Bell Laboratories.

In the meantime Dr. E. R. Buchman, working at Teachers College, New York, in Dr. Eddy's laboratory and Dr. Samuel Gurin had ascertained by classical organic methods the identity and location of the side chains which cling to the two nuclei. Dr. Buchman also applied the happy idea of a central pentavalent nitrogen atom through which the two nuclei are attached to one another. This was confirmed by potentiometric titrations by Mr. Ruehle

using a type of equipment developed for telephone corrosion studies.

Thus four distinct laboratories contributed personnel or facilities. If there had been need for other talents we should have sought them. Such is the coöperative principle in modern research. Nor should we forget the Carnegie Corporation who very generously supplied funds, nor even the much maligned depression which afforded additional week-end leisure for the work to the Bell Laboratories' contingent.

This is not the interior of a cathedral, but a typical sewer tunnel under a Chicago business street. In some parts, the tunneling is more than 19 feet in diameter. This immense sewage disposal project, the largest of its kind in the world, is being financed with an allotment of $42,000,000 from the Public Works Administration.

CLIMATIC AND OPERATIVE TREATMENT OF SPINAL TUBERCULOSIS*

EXCERPTED BY RICHARD A. BOLT, M.D., F.A.P.H.A.
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IN a comprehensive paper on Climatic and Operative Treatment of Spinal Tuberculosis, Dr. Fred H. Albee † gives a summary of our knowledge of surgical tuberculosis.

"Although quite readily distinguishable from one another by cultural, morphological, and inoculation tests, the bovine and the human tubercle bacilli are undoubtedly of common origin. That the two organisms are both responsible for human tuberculosis has been demonstrated abundantly; although what percentage of infections is due to each is the subject of divergent opinions. Bacteriological investigations by reliable workers have demonstrated the relation of a large proportion of bovine infection to an infected milk supply and a young age incidence. This is a natural sequence of events. The chief article of diet at the age when osseous tuberculosis is most common is milk. If this staple food is contaminated by the bovine tubercle bacillus, its ingestion is very naturally followed by tuberculous disease of the lymphatic nodes, cervical and mesenteric, and from this focus, a distribution of the bacilli to the bones and joints readily follows.

"*Portals of Entry of the Bacilli*—Antenatal infection may be disregarded as an unlikely possibility. The two most accessible channels of inoculation are the respiratory and alimentary systems. The relative importance of the two is still under discussion but unquestionably varies with the time of life, the preponderance of surgical tuberculosis in children suggesting the probable ingestion source at that time, while in adults the process is reversed, pulmonary lesions becoming the commonest and suggesting the respiratory origin.

"Other less common means of entrance are the tonsils, the pharynx, the skin (following wounds), the genitourinary passages and the teeth; in the pulp of carious teeth tubercle bacilli probably infect the submaxillary groups of lymph nodes.

"*Source of Infection of the Bones and Joints*—Direct infection of a bone or joint from without so rarely occurs as to be a negligible factor. The indirect avenues of invasion are of course the blood stream and the lymphatic system. Much important work has been done by investigators to determine whether one or both of these routes provided the path of infection and whether the bones and the joints were equally liable to invasion or stand in relation to one another as primary and secondary infections.

"From the mass of data accruing from these investigations, four conclusions may be drawn: (1) Experimental tuberculous lesions are difficult of production; (2) trauma is a relatively slight factor; (3) joints are much more susceptible to tuberculous infection than bones, and (4) the joints are infected through the medium of the blood stream.

"*Predisposition*—to the tuberculous condition may be exhibited by reason of (1) injury, (2) heredity, and (3) general causes.

"1. *Injury*—Although a history of previous injury is nearly always given, there is no doubt that in a certain number of cases traumatism is an important factor. The effect of injury may be felt in two ways: (a) by the production of a *locus minoris resistentiae* consequent upon a small effusion of blood and lymph in the cancellous tissue and a stagnation of the organism; and (b) where a preëxisting tuberculous lesion has been circumscribed, encapsulated and quiescent, trauma may provoke active spreading of the process and the production of an infiltrating tubercle; this, in the case of a tuberculous focus in or near the articular extremity of a bone, may cause extensive involvement of the neighboring joint. It is believed, however, that in the histories of tuberculous joint cases the frequent occurrence of trauma as a possible etiological factor is partly accounted

* Abstract of paper presented to the Midyear Conference of the International Society for Crippled Children, Tampa, Fla.

† Fred H. Albee, M.D., Sc.D., LL.D., New York City and Florida Medical Center, Venice, Fla.

for by the fact that emphasis is placed upon the injury because the joint was sensitive from the lesion already present.

"2. *Heredity*—The subject of direct heredity has aroused strong discussion, and although cases of apparently true congenital tuberculosis have been reported, it is believed that a tuberculous parent reacts upon its offspring in a less direct manner: (a) by actual transmission of the tuberculous virus to the subject during intra-uterine life (Baumgarten); (b) lowering of the vitality of the subject by reason of the impoverished state of the parent's blood; (c) a tuberculous parent stands as a constant source of infection by virtue of proximity to the child.

"3. *General Causes*—These all operate to lower the vitality of tissue and to render the soil fertile for the implantation and growth of the offending bacilli. Among the more important debilitating states are the exanthemata, influenza, inadequate feeding, and want of fresh air and sunshine.

"In the first place, it should be considered as a chronic lesion, with probable foci in other regions of the body, which may or may not precede it (the particular lesion under treatment).

"As a rule, conservative treatment takes priority over operative interference in osseous tuberculosis (except in the case of tuberculous vertebrae where a bone-graft or fusing operation is indicated in every case) in contradistinction to the treatment of monarticular joint tuberculosis, in which condition the reverse is true, especially in children. Operative measures should, however, be undertaken before bone destruction, secondary infection with abscess and sinus formation have occurred, and when lardaceous disease is threatened, especially in adults.

"The marked curative effect of bony ankylosis upon any tuberculous joint is axiomatic in orthopedic surgery. Without ankylosis, an advanced tuberculous process in a joint can never be said to be cured. In planning treatment of tuberculous spines, it is therefore of extreme significance that, anatomically, we are dealing with joints under constant uncontrollable mechanical influences, such as respiration and involuntary muscle spasm. This fact contributes greatly to the spread of the tuberculous process, prevents cure and makes for the development of extensive deformity, known as hunch back. It not only makes it more difficult for nature to set up a protective ankylotic process, but also presents increasing difficulties to the surgeon who attempts to bring about immobilization by nonoperative conservative measures."

Compulsory Health Insurance in Germany

THE available evidence is overwhelming that the effect of compulsory health insurance on the German medical profession has been little short of disastrous. The literature on the question, mostly in the German language, is as impressive as it is often pathetic in its pessimism regarding the outlook for far-reaching reforms. As has been well said in an article in *Science* of October 12, 1934: "The medical profession in Germany has fallen into disrepuate." . . . and "If present conditions are allowed to continue much longer, medicine will sink into a bog of absolute inefficiency." —Frederick L. Hoffman, LL.D., *California & West. Med.*, Feb., 1935.

EDITORIAL SECTION

Expressions of opinion and statements of supposed facts are published on authority of the writer under whose name they appear, and are not to be regarded as expressing the views of the American Public Health Association, unless such statements or opinions have been adopted by vote of the Association.

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SOCIAL SECURITY AND PUBLIC HEALTH

THE Federal Government's attempt to provide security against the major hazards of life is not a new idea. From the standpoint of health it has been one of the major objectives of the public health movement from its inception. Recent events have served to dramatize the whole topic of social security, by reason of large scale participation of the Federal Government in local economic and social activities. This participation has necessarily raised many difficult and fundamental questions of social policy and group relationships. The Association should be keenly alive to its responsibility for being certain that any proposed legislation or programs are in accord with sound public health policy. This does not mean the mere protection of the "rights" of the public health worker. It does mean the extension of adequate health service to all of the population without undue weight being given to interests of any special group of workers.

The scope of the pending social legislation before Congress merits careful analysis and constructive thinking. It holds out great promise for large scale financial assistance for local medical and public health programs. At the same time, it brings to focus several important controversial problems of policy and relationships.

The availability of federal funds for local health programs is now generally accepted as sound policy, though the question of the effects of central control is still raised in many quarters. There seems no sound reason why the federal relationship should not leave ample local autonomy, and at the same time assist in securing adequately trained health workers, proper local administration and programs.

The proposal to include medical care of certain groups in the public health program raises a definitely controversial subject. Among public health workers there are those who contend that the activities of the health department should be confined strictly to a program of prevention. They are convinced that the inclusion of the care of sickness will tend to obscure, if not submerge, preventive activities. It seems certain that no additions to the public health program should

deflect attention from our responsibility to provide adequately for control of communicable diseases, sanitation, infancy and maternity service, school hygiene programs, and public health education.

The proposals for health insurance are not primarily public health measures, but attempts to provide sickness care. We are definitely concerned with those aspects of this question which relate to possibility that public health departments will be concerned in their administration. This does not imply that the public health worker does not recognize the great importance of adequate sickness service as a measure for health preservation. As at present proposed, sickness insurance is not a primary responsibility of the health worker. If and when real provisions for preventive services are included, this will change the situation.

The proposed social security legislation brings to the fore another field in which there has been increasing tension. We refer to the relationships between the medical and public health professions. There has been an increasing organized opposition by the medical group to certain activities of the public health group. This opposition has centered upon those activities of the health worker in which personal prevention services have been rendered to the individual through group organization. The proposals to include certain types of medical care in the public health program have intensified this opposition.

We are convinced that a large part of the difficulty is due to a lack of a permanent effective mechanism for real contact between the governing bodies of the two organized groups. Such an arrangement has been in successful operation in England for many years. It has resulted in excellent relationships between the two groups, mutually helpful support for legitimate group objectives and improved curative and prevention services for the whole nation. We would advocate the exploration of the possibility of applying this idea to our problem of relationships at once.

NEED OF A 1935 CENSUS

DURING periods of normal prosperity, there has been in the United States, a pronounced movement of population from farms and villages to the cities. During the current industrial depression, however, this movement has been reversed; thus, the Department of Agriculture reported in 1933 that the rural population, which previously had been declining, had reached a new maximum.[1]

As a result of these and other abnormal migratory movements, recent population estimates made by the customary procedure, of projecting past intercensal increase into the future, yield figures for most intra-state areas which obviously carry serious errors. In recognition of these errors, the U. S. Bureau of the Census has felt unable to issue intra-state population estimates for 1934, and later years.

A bill calling for a federal census in 1934 was introduced into Congress, but was defeated, in spite of widespread support, apparently because of implications claimed to have a bearing upon the 1934 Congressional elections. That objection has now disappeared; and the demand for a census has therefore been revived, and a new bill has been introduced looking toward enumeration in the fall of 1935, or spring of 1936.

The Council of the Vital Statistics Section of the American Public Health Association on February 3 adopted a resolution in support of the census, and a

similar resolution has subsequently been approved by the Executive Board of the Association. It is hoped that as many members of the Association as possible will supplement this action by writing to their representatives in Congress and to the Secretary of Commerce, Hon. Daniel C. Roper. The resolution of the Executive Board follows:

WHEREAS, during recent years, abnormal population interchanges between cities and rural regions have rendered impracticable the estimation of intra-state populations by the usual methods, with the result that the U. S. Bureau of the Census has deemed it inadvisable to issue for 1934, and later years, the intra-state population estimates required for the calculation of death rates, morbidity rates, and numerous other measures of social welfare, therefore be it

RESOLVED that the Executive Board of the American Public Health Association urge that Congress and the President provide for a general population census in the year 1935.

REFERENCE

1. *The Agricultural Situation*. U. S. Dept. of Agriculture, 17, 5 (May 1), 1933, pp. 2, 5.

THE REGISTRATION FEE AT ANNUAL MEETINGS

IT will be remembered that a fee for registration at our Annual Meeting was first established at Montreal in 1931. It is not out of order to review the reasoning of the Executive Board when the step was taken, as a background for the comments which will follow upon the Association's experience with the plan in the last 4 years and the hopes for the future.

Every member knows his Association is not endowed and that it is not wealthy. The dues he pays amount to only one-fourth of the total sum spent on him every year by the organization. In other words, the income from all classes of membership equals approximately $25,000, while the Association expends $100,000—the difference being made up by *Journal* advertising, by sales of commercial exhibit space, by sales of books, by grants from insurance companies and foundations, and by field service.

The membership dues have never been increased. In 1872, the year of the society's inauguration, membership dues were established at $5 and have remained so to this day.

The Annual Meeting is an important Association function which unfortunately only a fraction of the membership finds it possible to attend. It is expensive to arrange and conduct. It must be self-supporting. Obviously, it would be unfair to distribute the costs over the entire membership by an increase in membership dues, as has been proposed on many occasions. The only equable plan is to place a nominal charge upon those who receive actual, personal benefits through attendance at the Annual Meeting; therefore, the registration fee was the device employed to assure the necessary amount, over and above the income from the sale of exhibit space, for financing our convention.

Other factors influenced the Executive Board in the adoption of the registration fee. One was the tendency, inevitable under the circumstances, for an Annual Meeting city to be selected almost exclusively upon its financial possibilities. Can exhibit space be sold easily? Will the Local Committee guarantee to make up any deficit? These questions were paramount, though they were recognized as

being unworthy of promulgation by a scientific society with a professional dignity to maintain. The registration fee, it was urged, would make the Association more independent in considering its convention locations.

These arguments, and many others in favor of the registration fee plan, as valid today as they were 4 years ago, were presented again and again to the membership. How has the membership responded? Some kicked openly and manfully, as was their privilege. Most of these finally agreed that, as President Cleveland once said, " It was a condition and not a theory which confronted us." However, a study of the last three meetings has shown that many of our members, as well as those who take advantage of our meetings as guests, have evaded their responsibility. The following is not a pleasant picture, but the truth must be told.

At Washington, D. C., in 1932, there were 296 names on the program, of whom 207 were members and Fellows, yet only 158 of these registered. There were 89 non-members and only 18 of these registered.

At Indianapolis, there were 266 names on the program, of whom 204 were members and Fellows, with 152 registrations. There were 62 non-members, of whom only 11 registered.

At Pasadena, in 1934, there were 306 names on the program, of whom 220 were members and Fellows. Only 138 registered. There were 86 non-members, of whom 15 registered.

The picture is especially dismal because the figures given above apply to those who took advantage of program participation and the publicity resulting therefrom and at the same time ignored their obligation. Program time is a coveted privilege and surely those to whom it is given should have the interests of the Association sufficiently at heart to live up to its regulations.

The comparison between the names on the programs and the registration list is easily made and incontrovertible. It is impossible to check the number of members not on the program who also failed to register, but the assumption is that the percentages are about the same. This means, therefore, that probably there were in attendance at the last three annual meetings 30 per cent more members than the registration lists record. The proportion of unregistered to registered guests is undoubtedly even greater if the figures above are any criterion, and may be as high as 75 or 80 per cent.

This is a bad showing. It is unfair. There is no justification for it.

It is hard to believe that members and guests intentionally avoid registering because of the small sum of $2.00 involved. The delegate receives infinitely more from attendance at the Annual Meeting than can be measured in dollars and cents. Every fair-minded member will admit it and ask himself if he wishes to be classed with those who accept the benefits of membership and withhold the support the Association deserves at his hands.

The Committee on Meetings and Publications, and the Executive Board, have been concerned over this problem. Recognizing the fundamental fairness of the registration fee and interpreting the attitude of the membership toward it as either carelessness or failure to understand properly its important function and necessity the Executive Board, at the instance of the Committee on Meetings and Publications, asks the *Journal* to explain again to our readers why the registration fee is necessary, and to urge them to support it. One hundred per cent coöperation depends upon such a simple thing as the determination of every delegate to register his attendance and pay his $2.00.

When a regulation adopted by the governing body in good faith and in the

best interests of the society is repeatedly and thoughtlessly broken, it is incumbent upon the policy-making group to do one of two things, either repeal it or enforce it. In the case of the registration fee, the Executive Board has seen fit to decide to enforce it, even to the extent of admitting to the scientific sessions only those delegates who display badges, indicating that they have registered. Members who have faithfully lived up to every demand made upon them, and who will continue to do so, will undoubtedly on occasion be inconvenienced by this, as well as those uncoöperative ones who have made the regulation necessary. To the former apologies are extended in advance, and their forbearance bespoken.

The American Public Health Association has a record of achievement of which all members should be proud. It is an honor to belong to such an Association, and the very few foreigners who have been elected to Honorary Fellowship appreciate highly the honor paid them. Practically every advance in public health measures can be traced to members of our Association, and most of them have been acted on officially by our body.

May we not insist once more that membership in the American Public Health Association is an honor to be sought after? May we not appeal to the patriotism of our membership to induce them to register at our meetings and pay their fees and urge their non-member friends in attendance to do likewise?

PUBLIC HEALTH EDUCATION*

Flamboyant and Not Polite—*Mother and Child,* London, does not seem to like public health education methods in the United States:

Health propaganda is to be studied at its flamboyant best in the United States of America, the cradle of this doubtful and difficult art; but a slavish imitation of American methods could never succeed in this country, where people are inclined to be affronted by the flamboyancy so effective in America, and where the approach must, above all things, be polite. To be fairly immune against the effect of the propaganda is perhaps a matter for self-congratulation, but it makes the propagandist's job a very difficult one.

The National Baby Week Council has done much to develop health propaganda in this country. It has experimented with various methods and has encouraged local enterprise. It is helping to create a new style, authoritative yet conservative, a style which manages to affect British opinion without offending reticence.

In *Mother and Child,* 5, Tavistock Sq., London, W. C. 1. Feb., 1935. *9d.* a copy.

"Medicine Men Take to the Air"—Under this title, *Business Week* tells about the rapid increase in the use of broadcast time by drug and cosmetic companies.

Some trade observers suggest that drug men are rediscovering the "medicine man" selling technic. But, says *Business Week:*

Others see in it more sinister implications. Curative and therapeutic claims, they point out, can be advanced with considerably less risk over the air than through the medium of the printed page. Censors have more difficulty checking them beforehand; critics find it less easy to prove a case against them afterward. And during the past year, because of the agitation over new food and drug legislation, curative and therapeutic claims have been subjected to far more exacting scrutiny than ever before—both by publishers and by the advertising review committee of the Proprietary Association which claims that it has inspected 27 millions' worth of advertising in the past 5 months.

The editor credits radio with efforts in the direction of censorship of claims for cures.

Radio's troubles with curative and therapeutic claims are not, however, limited solely to the broadcasts sponsored by the drug and cosmetic manufacturers. Apparently encouraged ("challenged" might be the better word) by the success of these programs, food sponsors are emphasizing with growing insistence the health values of their products. Nor are these claims confined to such broadcasts as those sponsored by Fleischmann's Yeast, Cocomalt, Ovaltine, and Postum; cereal manufacturers are making aggressive moves in this direction, and lately even Wrigley's has recommended chewing gum for its healthful and beautifying effects.

In *Business Week,* 330 W. 42d St., New York, N. Y. Feb. 9, 1935. *20 cents.*

A.P.H.A. Year Book: 1934–1935—Readers of this section will wish to study the "Resolutions" chapter for possible reminders of emphasis desirable in the months ahead.

Likewise a review of the numerous committee reports may provide valuable background material, especially when we need statements of approved practices or of aims in special fields.

Be sure to check possible uses of the objectives (and their "first fruits") of the A.P.H.A. which correspond closely with the objectives of public health. (We do wish that there was recognition of popular health education

* Please address questions, samples of printed matter, criticism of anything which appears herein, etc., to Evart G. Routzahn, 130 East 22d St., New York, N. Y.

as a large factor in making possible the harvesting of the "first fruits" there listed.)

P.H.E. Section in the Year Book—The Year Book, 1934–1935, record for the Public Health Education Section:

Committee on Fellowship and Membership—William P. Shepard, M.D.

Committee on Administrative Practice—Ira V. Hiscock on Sub-Committees on Record Form, Manual of Public Health Administration, Annual City Health Department Reports, and Relationship of Social Workers to Public Health.

Committee on Professional Education—C. E. Turner, Dr.P.H., Secretary; John Sundwall, M.D. Sub-committee on Training and Qualifications of Health Officers—C. E. Turner, Dr.P.H. Sub-committee on Training of Public Health Educators—C. E. Turner, Dr.P.H., Chairman; John Sundwall, M.D.; William P. Shepard, M.D.; Mary P. Connelly, R.N.; Edna A. Gerken.

Committee on Meetings and Publications—Homer N. Calver. Associate Editors of *Journal*—Evart G. Routzahn. Sub-committee on Scientific Exhibits—Homer N. Calver, Chairman; Bertrand Brown; H. E. Kleinschmidt, M.D.; Evart G. Routzahn.

Committee on Research and Standards—C. E. Turner, Dr.P.H.

Nominating Committee—W. W. Peter, M.D.

Committee on American Museum of Hygiene—Homer N. Calver; Bertrand Brown; Evart G. Routzahn.

Committee of P.H.E. Section on Methods in Health Education—Ira V. Hiscock, Chairman; Homer N. Calver; Mary P. Connelly; Iago Galdston, M.D.; Elizabeth Nickerson; Evart G. Routzahn; William P. Shepard, M.D.; C. E. Turner, Dr.P.H.

What Shall We Call It?—A terminology Committee of the Health Education Section of the American Physical Education Association has tackled a much needed job. The committee has prepared terms and definitions, largely from the angle of school health education.

A report will be presented for action at the annual meeting of the A.P.E.A. in April. The committee, Jesse Feiring Williams, Chairman, includes among others, Louise Strachan and Anne Whitney.

In anticipation of the final action we give but three of the terms to illustrate what is being done. The term and definition appear in italics; followed by

. . . a paragraph of informal discussion that seeks to amplify the definition, to give the reasons for the decision made, or to indicate more specifically the application or limitation of the term.

I. ***Health Education is the sum of all experiences which favorably influence habits, attitudes, and knowledge relating to individual, community, and racial health.***

Health Education is a general term covering a wide field of human experiences. It includes more than just instruction in health and should be used to designate the broader field.

II. ***School Health Education is that part of Health Education that takes place in school or through efforts organized and conducted by school personnel.***

The child is educated in health in all his experiences that in any way influence favorably his habits, attitudes, and knowledge relating to health, but the experiences he has that emerge from and are identified with school life are those of *School Health Education.*

This aspect of *Health Education* is definitely linked with *Public Health Education* as it operates in the home and community.

III. ***Public Health Education is that part of Health Education that takes place in home and community.***

This phase of *Health Education* operates largely through the efforts of health departments and various semi-public or private agencies interested in promoting health among the people. As a rule the methods used are those of general publicity such as radio, newspapers, distribution of literature, lectures, study groups, conferences etc., but the work done in homes by public health personnel is also *Public Health Education.*

Public Health Education reaches children as well as adults and thus is one kind of experience relating to health.

The public health official who comes into the school to control communicable disease is

in effect a school official and hence this experience of the child may be regarded reasonably as an aspect of *School Health Education*.

Meet "Bill the Driller"—*Ohio Health News* reminds its readers that more drilled-well water supplies are contaminated from above than from below the surface. The *News* quotes from *Johnson's National Driller* what "Bill the Driller" says on the subject:

Fer th' good of our own business as well as th' safety of our customers, us well drillers ought to follow ev'ry reasonable thing that th' health officers, engineers or other people suggest to protect our wells from pollution. I never cut off th' top of a well casin' below ground level if I can help it, an' where I have, I seal th' top around th' pump an' casin' both as tight an' fool-proof as I can. I arrange fer drainage into a gravel fill an' keep a sharp eye against chances fer floodin' from th' surface or sewers.

More paragraphs follow, but the above is enough to suggest that health agencies look up well drillers and "get them educated." Also enough is quoted to emphasize the idea that we try to present health and trade health responsibilities in terms of the different crafts and professions.

Ohio Health News, State Dept. of Health, Columbus. Jan. 1, 1935.

"Exhibit of Food Fads and Fallacies," by H. S. Mitchell, tells of an exhibit of materials about food fads and fallacies as a part of a community education project. The exhibit was shown at a recent meeting of the American Dietetic Association.

Every home economist is aware of the fact that there is much false printed material in circulation in the form of advertisements and magazine and newspaper articles. Samples of such quack publications come to our attention at intervals, but a large collection of such material arranged so that it can easily be read, makes a striking educational exhibit and brings out the point that it is not always a simple matter to choose between the true and the false. Even for a group of dietitians it was necessary to label carefully the false material to avoid any chance of misinterpretation. The worst statements or paragraphs were underlined or marked in bright red.

The printed matter was mounted on large black cardboards.

"What about Food Combinations," with a large question mark following it, was the heading on a board which carried samples of some 15 or more articles and tables of foods stating which should or should not be combined. The dire consequences of the wrong combinations designated by one "authority" as likely to produce toxic poisons, by another as leading to the possibility of an explosion, were well worth underlining. Such fads about food combinations have perhaps swept the east and west coasts more than other parts of the country, but in general an intelligent group of people is apparently being won over by these erroneous ideas.

"Is there Supermagic in Minerals?" was the heading for

. . . numerous magazine articles in which some specific mineral was presented as a panacea for many ills. In other instances famous movie stars and other prominent people were pictured and designated as belonging to particular mineral types and requiring specific foods because of these types. Iodized foods were recommended as panaceas for a variety of ailments.

"Short Cuts to Reducing?" introduced

. . . samples of the many advertisements for quick-reducing remedies (the dangers of which are well recognized by any home economist), especially mineral water, salts, and remedies containing dangerous drugs, all recommended by their various advocates.

"Do You Believe Everything You Read?" headed other groups of false advertising and fallacious articles. "The Nutritionist Looks at Food Fads" headed a collection of sound articles, some of which are listed.

In *Journal of Home Economics*, 101 East 20th St., Baltimore, Md., Feb., 1935. *30 cents*. In the same issue see editorial on "Food Fads and Fallacies."

Those interested may learn through American Dietetic Association, 25 E. Washington St., Chicago, Ill., if your state has made up an exhibit.

The general idea may be worked out in a variety of ways. The headings suggest a series of articles, a study course, or meeting topics. This approach could be applied beyond the field of food, and even without reference to misleading articles or advertising. The exhibit plan illustrates the possibility of reëxamining our material for new angles of presentation.

How the Smiths Learned and Shared—Jean Pinney undertakes to answer "How Much Does the Public Know about Social Hygiene?" And her effective device for showing progress is to tell the story of the Smiths, what they said and what they did, from immediately before the Great War up until today. It is a genuine "success story" for the social hygiene movement, but it presents a convincing moving picture of changing ideas and effective activities. This article with other material in the Jan. and Feb., 1935, issues of *Journal of Social Hygiene*, constitute one of the best annual reports of a national health agency and of a national health movement. Address: 50 West 50th St., New York, N. Y. Each issue, *35 cents*.

Using People in Rural Communities—"Utilizing Organized Groups in a County Nursing Program," by A. B. Stoll, might well read "Utilizing Organized Groups in a County *Health* Program." Read before a Jackson, Miss., conference it is a small city and rural presentation.

From "How to Use Volunteer Help Effectively" we quote:

> Going to our card index or notebook, we hunt through it, finding out what special interests we have tabulated among the committee members. Here we have one who has studied typing and can get no work. When we ask her if she is losing her skill and speed, we often find she is worried over just that thing. She will be a rare person if she will not help us with some of our clerical work and indirectly keep herself in form. She can be taught mimeographing and can assist in preparing the quarterly reports for the central health committee. Others may want to keep up in dictation. Requests sent in to graduates of night school often bring results. . . .
>
> Occasionally, we may find someone who has a special talent for writing who may prepare excellent articles with local interest from authentic information. He also would be responsible for publishing news items concerning the activities of his own committees.
>
> Those who can entertain successfully in their own homes will be interested in planning exhibits, programs, and entertainments for their organization. . . .
>
> Add gradually to your card index another section containing the names of the people whom the health department has helped outstandingly. I recall a story of a health officer who said he had discovered that a child of a lawyer needed glasses badly. The father looked up the director and expressed his appreciation to him and then the father added, "Why, the little fellow has always been that way and we didn't know he couldn't see." When that officer has difficulties, he goes to that man and things mysteriously happen. We have all had experiences like that and we forget about them. But in time of stress such information could be turned over to your health committees and the services we gave, without thought, could come back bearing multiplied results—not to us, but for increased opportunity for service to others.

In *Public Health Nursing*, 50 West 50th St., New York, N. Y. Jan., 1935. *35 cents*.

The School Nurse Helps the Teacher—How the school nurse shares in educational work is brought out by E. N. Scramlin in "The School Public Health Nurse a Health Educator." One

> . . . important educational contribution of the school nurse should be that of serving as adviser to the teachers. The teaching profession is probably one of the most harassed in the world. However eager a teacher may be, it is humanly impossible for her to keep abreast of all the topics in which she is interested, and almost no field of information changes so rapidly as that of health. Scientific research today renders yesterday's dogma obsolete tomorrow. The nurse may make one of her most valuable contributions that of acting in an advisory capacity to the teachers,

keeping them posted on the best bibliographies, and assisting them in evaluating health books and other sources of health information.

Other specific opportunities are mentioned, and it is emphasized that

In a wider sense the school nurse becomes a teacher and educator with every professional contact she makes, whether it be with student, teacher, or parent. Every physical examination should be done with the coöperation and interest of the student that it may become a teaching situation of value. Every inspection of an ill child and every case of first aid is a learning situation. The nurse who understands will create with every contact a favorable attitude not only toward the medical profession but toward finer ideals and standards of living in the child.

In *Public Health Nursing*, 50 West 50th Street, New York, N. Y. Feb., 1935. *35 cents.*

Hygeia, March, 1935—Background and quotable material offered in *Hygeia*, American Medical Assn., 535 N. Dearborn St., Chicago:

Animal experimentation. Mental strain masking as physical disease. Food fads (against generalized hard and fast rules). If you have a lump in your breast. Pneumonia. Massage vs. mauling. Healthgrams. Posture. Slum elimination. Beulah's Bunion (a fable). A.M.A. committee on fish. The house fly. Eye diseases during adolescence. A straight face and straight teeth. How to make health attractive to the child. Tonsils and tact. What to do and what not to do for fever. The medicine men (a puppet play).

Under "School and Health":

The classroom teacher studies the community. Health teaching in March. Solving health education problems. New health books for teachers and pupils.

Hygeia will send a copy free to a teacher or health worker.

Simple Dramatics—"The Medicine Men," by John Finney, is one of the few adaptations of health material for puppet presentation. For children/adults—by children/adults.

"The World's a Stage," by Sophia Yarnall, tells of a mother's use of costume plays and home "broadcasting" by young children. This project offers possibilities where health stories are available, say to members of parent-teacher groups, and others. Copies of this article or condensed explanations of the idea may be used in testing the project.

Both in *Hygeia*, 535 N. Dearborn St., Chicago, Ill. March, 1935.

England Honors Hamilton's Health Education—The Hamilton, Ont., Public Health Dept. has been honored by having two pieces of health propaganda reproduced in *Mother and Child*, 5, Tavistock Sq., London, W. C. 1, together with this comment:

The Hamilton (Ontario, Canada) board of health has a remarkable gift for keeping its activities "in the news." The *Hamilton Spectator* periodically devotes an entire issue to the question of public health. The latest special health issue is an excellent example of good journalism and sound propaganda.

Education Against Cancer—From "The Present Status of the Educational Campaign Against Cancer" we quote:

It is very human and understandable to attack an obvious condition that announces its own presence. Such efforts should be continued. They are laudable and constructive. These facts, however, should not blind us to the greater problems which call for long-time and general coöperation.

The effort needed to organize and establish a national educational campaign in any phase of public health, is so great that no group or groups care to undertake such a program without a great deal of careful preliminary study. This work has actually formed a considerable part of the society's program during the past 5 years.

It has been necessary first of all for the American Society for the Control of Cancer to establish in its own mind beyond any doubt that certain types of cancer in their early stages are curable. This it has done.

It has next been necessary for some one to study the facilities for treatment and to aid in informing the medical profession of what can be accomplished. This work is being

splendidly performed by the American College of Surgeons, the American Medical Association, and by the various National Radiological Societies.

Having carefully built up a foundation of scientific and medical knowledge concerning the disease itself and the facilities for its treatment, the next step is clear. This consists of the establishment of local organizations which will assume the responsibility and expense of educating the laity to recognize signs and symptoms which may mean cancer and to report those signs and symptoms *immediately* for diagnosis and treatment. This work will form the major activity of the American Society for the Control of Cancer for some years to come.

The Board of Directors of the Society are hard at work on the problem and an important announcement of the future program may shortly be expected.

In *Bulletin,* Am. Society for Control of Cancer, 1250 6th Ave., New York, N. Y. Feb., 1935. *10 cents.*

MAGAZINE ARTICLES

"Has Insulin Failed?" by Dr. W. W. Bauer. *American Mercury,* 730 5th Ave., New York, N. Y. Nov., 1934.

"Poison Hunters," by R. Lord. The food and drug staff of Dept. of Agriculture. *Today,* 152 West 42d St., New York, N. Y. Feb. 2, 1935. *10 cents.*

NEW

Flashes, State Committee on Tuberculosis and Public Health, S.C.A.A., 105 East 22d St., New York, N. Y. House organ for county and city workers throughout the state. Mimeographed, with two-color printed cover sheet, date and number being mimeographed on the printed sheet.

RADIO

Is it WEAF or W.E.A.F.—as it appears anywhere but in a health agency release or a health publication?

Reported by *Education by Radio* (1201 16th St., N.W., Washington, D. C.), Jan., 1935:

Radio station CKUA, the University of Alberta, Edmonton, Alberta, presented on Monday, January 7, a program entitled, "Venereal Diseases—Prevention and Control." The speaker was Dr. Harold Orr, director, social hygiene division, Provincial Department of Health. The program was given at 2 p.m. and was presented not only by the University station, but by stations CFAC and CJOC.

Says *Variety,* amusement weekly:

Radio has been guilty of cheapness and tawdriness and phony sentimentality, but it's always been on the side of obedience, reverence, holy wedlock, and spinach. . . . Radio is probably the most sanctified amusement in history.

"Keeping Well," is made up of "the first 100 radio talks broadcast by Baltimore City Health Department and Medical and Chirurgical Faculty of Maryland from Station WBAL." 193 pages; contents and index; list of the Public Instruction Committee of the Faculty. The 100 talks include one monologue and two dialogues.

"A Day in an Emergency Ward," by Dr. J. J. Moorhead, was an effective idea for a broadcast. In this particular instance this was less description and more appeal for support than usually would interest the radio audience. United Hospital Fund, 122 East 22d St., New York, N. Y.

"The Romance of a Hospital," by B. Fingerhood. Explaining some misunderstood aspects of the hospital. *Bulletin,* Am. Hospital Assn., 18 East Division St., Chicago, Ill. Jan., 1935.

"Common Sense and the Child," an English broadcast series included some catching titles:

Running a dinner centre for country school children. Is he growing properly? "Catching" illnesses. Should he have a dose? Aches and pains.

A.M.A. broadcasts are scheduled over N.B.C. at 5 p.m., E.S.T., Tuesdays; over C.B.S., Thursdays at 4:30 p.m. A list of the stations appears in *Hygeia.*

American Medical Assn. broadcasts in March:

Surgery in diabetics. Food and drug law

revisions. White collar hazards. Plans for economic security. Headache. Physical defects. Rickets. This is no April fool.

Baltimore Health Dept. and Medical and Chirurgical Faculty broadcasts:

The health of your child in school. Baltimore's health record for 1934. Oysters. Infected eyes in infants. A day with a public health nurse. City health for a cent and a half (health in city tax dollar). Meningitis. Your heart at fifty. Rheumatic fever and the heart. Some Christmas cautions. The pestilence that walketh in darkness (tuberculosis). What to do until the doctor comes.

Connecticut Dept. of Health broadcasts over WTIC:

Controlling your weight. The laboratory an ally in pneumonia. Health protection in industry pays. Keeping your child well during the winter months. Things are seldom what they seem (problem behavior). Statistics measure progress. Bad news for pneumonia germs. Dividends from public health work. Working environment (occupational disease). Man's struggle for health. Finding defects early. Unusual accidents. Safeguards for public water supplies.

The Hartford, Conn., Tuberculosis and Public Health Society has had a twice weekly radio program: over WTIC in coöperation with Hartford Medical Society; with lay speakers over WDRC on the health activities of various local agencies. Some of the topics:

That fat bugaboo. The hoarse voice. Diagnosis and correction of posture defects. Oral hygiene. Overcoming tuberculosis. Neuritis and neuralgia. Child guidance. The cross-eyed child. Diabetes and tuberculosis. Diet and digestion.

Illinois Dept. of Public Health broadcasts over WCFL:

Enemies 1/8000 inch in length. Health progress in 1934. Shell shock in everyday life. When a fellow needs a friend Science and human guinea pigs. Fighting foes too small to see.

Illinois Dept. of Public Health broadcasts over WGN:

Mental hygiene faces the newer facts. Crime and the new deal in mental hygiene. Are you superstitious? On the fringe of silence. The biological miracle of five centuries. Medicine marches on. Hair-raising information. The "white-collar disease."

Minnesota State Medical Assn. broadcasts (Tuesday) over WCCO:

Insomnia. Appendicitis. Problems of the blind. Cancer research.

DATES AHEAD

Among these may be found opportunities for coöperation with other groups; timely angles for newspaper, radio, or public speaking material.

May 1, 1935: May Day—Child Health Day. Write to your State May Day Chairman or to your State Health Dept.

April 27–May 4, 1935: Youth Week. "Designed to include boys and girls from about 10 to 18 years of age." Address National Youth Week Committee, 35 E. Wacker Drive, Chicago, Ill. Wednesday, May 1: Youth's Health Day and Evening at Home.

To stress the responsibility of the family for the welfare of boys and girls and to emphasize the importance of having a sound body to insure a sound mind.

May 11, 1935: American Indian Day. Health implications for boys and girls.

May 12, 1935: Mother's Day. "To make maternity safe" in the country where it is more dangerous to be a mother than almost any other known as "civilized." Address Maternity Center Assn., 1 East 57th St., New York, N. Y.

May 12, 1935: National Hospital Day. A "bulletin of 35 suggestions for its observance" will be supplied by American Hospital Assn., 18 E. Division St., Chicago, Ill. Arrangements have been made for hundreds of addresses, and for broadcasts from over 50 stations.

MOTION PICTURES

American Medical Assn., 535 N. Dearborn St., Chicago, Ill., has prepared a 16mm picture

. . . so that county and state medical societies as well as other organizations might be informed of the nature of the work in the headquarters office. . . . It shows the personnel of the various bureaus and councils of the Association, the executive officers, the members of the Board of Trustees and of the House of Delegates, the composing, printing, binding, addressing and mailing departments, the manuscript editing rooms and the library, and many other activities of the headquarters office. . . . It is planned to add pictures of all the different councils and official bodies so that the film will constitute a true record of the history of the Association at this time. Adequate subtitles explain the nature of the work shown, but the affairs are so complex that space is simply not available in a subtitle to indicate fully the significance of the various activities. The Board of Trustees and the office of the Secretary of the Association will be interested in hearing from county and state medical societies or other bodies that are interested in showing this film.

State Dept. of Health, Albany, N. Y., is using a picture produced by Bureau of Milk Publicity, Dept. of Agriculture and Markets:

Three clowns—Health, Pep, and Strength—demonstrate the advantages of milk. Flashes of actual persons engaged in sports, business and other activities, combined with animated cartoons of elflike characters, cleverly illustrate the importance of milk as a principal source of the food elements essential to proper growth and development of the human body. Pictures of the dairy industry show the sanitary methods essential in each step of the production and distribution of safe milk, from the farmer's pail to the consumer.

A news dispatch is quoted in *Health*, Canadian Social Hygiene Council, 105 Bond St., Toronto, Ont.:

Officials of the Canadian Social Hygiene Council are gratified that the showing of a picture produced by the council provoked a debate in the House of Lords in London on the need for certificates of medical fitness for parties proposing to marry.

The debate was instigated by Lord Kilmaine who mentioned that he had seen the picture, "Damaged Lives," an educational picture dealing with the problem of social disease, produced under the technical direction of Dr. Gordon Bates, General Director of the Canadian Social Hygiene Council.

This picture, according to the council, has been shown to millions of persons in a large part of the civilized world. Its showings in England were with the full approval of the British health ministry and social hygiene council. It has also been shown in Canada, United States, Australia, New Zealand, Mexico, Argentina, Chile, Brazil, France, and Spain.

MOTION PICTURES IN ENGLAND

A recent motion picture is "Rules for Jim," by National Baby Week Council, 117, Piccadilly, London, W. I. The sound version, 12 minutes; silent, 15 minutes.

"How to Run a Schick Clinic without Tears" pictures clinic methods which have met the fears and doubts of parents, and is the outgrowth of 5 years of successful campaigning by Dr. E. H. T. Nash, Medical Officer of Health, Hounslow, Middlesex, England. The film is being offered for use throughout the kingdom.

A new 16mm film is offered by National Council for Maternity and Child Welfare, 117, Piccadilly, London, W. I., which

. . . represents a mother bathing her baby in her own home. The different scenes illustrate undressing, habit training, bathing, making up the cot, and the activity of a normal healthy infant. This film should make an appeal to many and various audiences, partly on account of its human interest so delightfully illustrated by the activities, cries and smiles of a perfect 2 months old infant, and also on account of the technical accuracy which Sister Kennedy expresses in such a calm, unhurried manner. It will delight and instruct at the same time, and prove of great value to Health Week campaigns, infant welfare centres, women's groups, fathers' councils and to school-girls.

REPORTING

"Activities—1934" is a mimeographed report of Rapides Parish Health Unit, La. Several pages of description and comment; statistics; and illustrated cover—health problems on left, health activities on right. The kraft paper is a bit dark, but then it is "a Louisiana product."

The annual report of Lincoln, Neb., Board of Health is 4 by 9 inches in size, 16 pages and cover. The usual dull appearance of statistical tables seems to be lessened by the narrow pages. Some brief explanatory paragraphs will help the lay reader to get the significance of some of the data.

" Estado de Nuevo Mexico Departamento de Salubridad Publica, El Octavo Informe Bienal, 1933–1934 " appears on one cover of a 40 page pamphlet, but turned over the cover reads: " State of New Mexico Bureau of Public Health, Eighth Biennial Report, 1933–1934." The text and *table of contents* appear in both languages.

" Guarding the Health of Baltimore " is an attractive looking pamphlet of 35 pages issued annually by Baltimore Health Dept. A reprint of the Commissioner's Report from the annual report; pleasing blue cover; text on rough finish paper. Illustrated.

" Health unlocks the door to happiness " is the " Health Officer's 1934 Report, Middletown, N. Y." Mimeographed; 15 letter-size pages; illustrated. Tint and weight of paper, quality of mimeographing, the illustrations, and the homely comment place this in the front rank of small city reports. *It has a table of contents.* Report mentions that a Middletown leaflet on diphtheria was reproduced in several cities.

In " Fifty Years of Health Progress in Rochester " the bulletin of Rochester, N. Y., Bureau of Health, makes good use of the historical comparison. The 50 years includes the full period for which Rochester has comparable figures.

Palo Alto, Calif., Health Dept. issues an annual report with an unofficial looking cover, but dignified and pleasing.

A self-indexed annual report of the Florida Tuberculosis and Health Assn., Jacksonville, is small enough for correspondence enclosure and pleasing enough for popular reading. Each of 8 leaves is a half inch wider than the preceding one so that the " contents " may be read from left to right on the unopened pamphlet. Copy for *3 cents.*

" Ten Years at Bellevue-Yorkville: An Experiment in Health Center Administration " is the report of a meeting which practically marked the close of the last of the group of health demonstrations in New York State. The project continues as a municipal health center at 325 East 38th St. Mention is made of 3,000,000 pamphlets having been distributed in the district.

Students Study at a Sanatorium—High school seniors are being given first hand information about tuberculosis prevention and treatment as illustrated by the equipment and practices of a tuberculosis sanatorium under the sponsorship of the St. Louis Tuberculosis and Health Society.

Groups are taken through Robert Koch Sanatorium with explanations and demonstrations of equipment for diagnosis and treatment. A question and answer session follows in the auditorium of the hospital, together with a motion picture illustrating the main points to understand about tuberculosis.

According to a check-up of the students who have attended these sessions it is reported that " 100 per cent felt that they had definitely benefitted by the classes." A general finding is that fear has been dispelled and interest become more active among these students. Some local education and health authorities have suggested that the plan be extended to lower grades.

BOOKS AND REPORTS

A REVIEW OF SELECTED BOOKS OF INTEREST TO PUBLIC HEALTH WORKERS

MAZÝCK P. RAVENEL, M.D.

FOR several years we have omitted our annual review of books on public health, partly because there were fewer received and partly on account of financial conditions. During 1934 there have been a number of excellent books and it has seemed wise to renew the custom of an annual review. This covers books reviewed in our *Journal* in 1934 as well as some which have been received but reviews of which have not yet been published, though some of them have been written. We have also followed the reviews in a number of other journals, in England and this country. Under the head "Miscellaneous" will be found a number of titles which might very well be classed under other heads. We have avoided German and French books which have not been translated and published either in England or this country. One French book is of such importance, however, that we have included it.

Perhaps the workers in industrial hygiene have been more active than other groups. There have been many incidents which have brought the problems of industry strikingly before the public. There have been many new chemicals, some of which are poisonous, brought into use in various lines of work, which have raised new questions and led to suits for compensation. Among important books on this subject we may mention *The Human Problems of an Industrial Civilization,* by Elton Mayo, Macmillan. This is made up of the Lowell Lectures for 1933, and will interest all who have to do with employee problems. There is no adverse criticism to be made of *Science of Work,* by Morris S. Viteles, Norton. It covers a large field. The selections are well made and the illustrative material is concrete and to the point. It is obviously written for non-technical readers, but is systematic and well done. *Industrial Health Service,* by L. D. Bristol, Lea & Febiger, gives the first appraisal forms, (1) for smaller industries; (2) for personnel and industrial relations services, though they were considered in the section on Industrial Hygiene of the Association, and a suggested form presented to our Committee on Standard Practices in 1932. *Industrial Toxicology,* by Alice Hamilton, Harper, is an excellently organized, comprehensive, and terse book, and is especially timely on account of the many new chemicals used in various industries, especially dyeing, rubber manufacture, metal plating, etc.

Few subjects have been less understood than heating and ventilation, though of great importance, since workers in many lines are exposed to extensive ranges in moisture and temperature. *The Principles of Heating and Ventilation,* by H. M. Vernon, Edwin Arnold & Co., has been described as "a source of welcome enlightenment indeed." An outstanding book is *Industrial Maladies,* by the late Sir Thomas M. Legge, Oxford Medical Publications. Unfortunately, this well known student of industrial diseases has passed away. Studies of much significance are *Occupation and Health,* Vol. II, Letters I to Z, International Labour Office; and *Death Rates by Occupation* by Jessamine S. Whitney,

National Tuberculosis Association. The various types of pneumonoconiosis are among the more urgent problems in industrial hygiene. Some firms have been forced to the wall by claims for damages. Abrasives are much used. A striking instance of injurious work is that of a tunnel bored through rock containing much quartz. Physicians, engineers and others are called on to testify in such cases and to arbitrate and adjust claims. For them, such a book as *The Pneumonoconiosis Bibliography and Laws*, by Davis, Salmonsen and Earlywine, *Industrial Medicine*, is of much value. The tunnel incident, which led to a number of suits, brought out *Symposium on Silicosis*, by Trudeau School of Tuberculosis, Employers' Mutuals, Wausau, Wis., which is indispensable to those interested in the silicosis question.

The importance of the nursing profession and especially of the public health nurse is coming each year more and more to the fore. Among the books on this subject we will mention *Survey to Public Health Nursing*, by N.O.P.H.N., Commonwealth Fund. It will be seen that this is authoritative, having been handled by the organization devoted to public health nursing. Interesting and valuable is *Nursing History*, by Minnie Goodnow, Saunders, which is unusual in its type and scope, being very human and showing the trend of the care of the sick up through the ages, and mentioning even the care of animals in some conditions. Among special subjects are *Obstetrical Nursing*, by Carolyn Van Blarcom, Macmillan; *Pediatric Nursing*, by Gladys Sellew, 3rd ed., Saunders; and *Keeping Campers Fit: The Theory and Practice of Camp Nursing*, by Elena E. Williams, Dutton. The latter is a rather unusual book, useful on account of the many summer camps in various parts of the country. It discusses the types of cases likely to be met with by the camp nurse, and gives first aid for them. The author regards these camps as a useful field for practice.

America has made a bad showing on the score of maternal mortality, two especially useful studies of which have appeared during the year. *Maternal Mortality in New York City*, by Committee on Public Health Relations, New York Academy of Medicine, Commonwealth Fund, is a timely and valuable study, applicable especially to New York City, but containing much material of general application. *Maternal Mortality and Morbidity*, by J. M. Munro Kerr, Wood, is a most complete and exhaustive study, and while made on material gathered in England, Scotland, and Wales, the basic factors are comparable with those in the United States.

History: Two most interesting books, *Chinese Medicine*, by William R. Morse, Hoeber; and *Japanese Medicine*, by Y. Fujikawa, Hoeber, belonging to the series, "Clio Medica," edited by E. B. Krumbhaar, have appeared. They cover the story in a remarkably succinct manner from ancient times up to the present. Several books of a more or less general type giving much medical history have appeared. Perhaps the best of these is *Medicine: A Voyage of Discovery*, by Josef Lobel, Farrar & Rinehart. It is an exaltation of medicine, most interesting and correct for the most part. A book with an engaging title, *The Great Doctors*, by Henry E. Sigerist, Norton, should be mentioned, which in spite of inaccuracies in statement as well as in implication, contains useful material. Bacteriology, on which modern public health is largely founded, has been greatly aided through the invention of the Abbe condenser and the use of aniline dyes. The Biological Stain Commission, with headquarters at Geneva, N. Y., has put laboratory men of all kinds in its debt, which is now

increased by *The History of Staining*, by H. J. Conn, a most valuable contribution.

Allied to medical history is *Great Men of Science*, by Philipp Lenard, Macmillan, which contains material concerning men of science which should be more or less familiar to all educated people.

In this group might well be classed some notable biographies and autobiographies. *Lord Lister: The Discoverer of Antiseptic Surgery*, by C. J. S. Thompson, John Bale, Sons and Danielsson, is a short and excellent picture, with many facts drawn from the classic biography by Sir Rickman John Godlee. *Benjamin Rush*, by Nathan G. Goodman, University of Pennsylvania Press, is the first biography ever written of Benjamin Rush, known as "The American Sydenham," in spite of the many articles and books written on certain phases of his career. It is excellently done and should be in the library of every physician in the United States. *The Joy of Living*, by Franklin H. Martin, Doubleday, is by one of the most efficient and active medical organizers in this country or any other. He has lived through a period characterized by great advances along practically all lines, and gives an interesting account of his experiences in pushing the interests of the medical profession forward. *A Soldier in Science*, by Bailey K. Ashford, William Morrow & Co., appeared a short time before the author's death. It is delightfully written, and though we cannot agree with all the author claims, there is no question that his work had a profound influence on health in the tropics and on the study of tropical disease.

Health officers particularly should know a great deal about veterinary medicine. *Manual of Veterinary Bacteriology*, 2nd ed., by Raymond L. Kelser, Williams & Wilkins, is a book by a man whose experience in the Army has led to constant associations with medical men as well as with biologists, and the practical application of scientific knowledge. There is a chapter on protozoa by Charles F. Craig. *The Biology of Bacteriology*, by Arthur T. Henrici, D. C. Heath & Co., is a useful book, written from an unusual angle. New editions which deserve mention are *Pathogenic Microörganisms*, by William H. Park and Anna W. Williams, Lea & Febiger, 10th ed.; *Bergey's Manual of Determinative Bacteriology*, Williams & Wilkins, 4th ed. *A Text-Book of Bacteriology*, by Hans Zinsser and S. Bayne-Jones, Appleton-Century, though called the 7th edition of the book by Hiss and Zinsser, is practically a new work, considerably enlarged and brought much more up to date.

Under this head we must mention *Text-Book of Meat Inspection*, by Robert V. Ostertag. Translated by C. P. Marshall, and edited by T. Dunlop Young, Alex Eger. This is an entirely new book by a master. The translation is excellently done and both the English and American editions have been edited by a veterinarian. In the appendices are given the laws regarding slaughter, handling, curing, and sale of meats in Germany, England, Australia, and America. It should be in the hands of all health officers though written especially for veterinary physicians, many of whom hold positions in the inspection service. *Text-Book of Meat Hygiene*, by Richard Edelmann, 6th ed., translated by John H. Mohler and Adolph Einhorn, Lea & Febiger—This translation of the 6th German edition has been well done. It is a smaller book than that by Ostertag, and excellent in every respect.

Outline of Immunity, by W. W. C. Topley, Wood, is a new book which shows a mastery of the intricate subject of which it treats. The facts and theories are clearly stated. The importance of protozoan diseases need not

be emphasized, since epidemics during the past 2 years have done that for us. We welcome that standard work *Biology of the Protozoa,* by Gary N. Calkins, 2nd ed., Lea & Febiger. This second edition of a well known book contains a new chapter on parasitism and disease, adding much to its practical value.

Two excellent books have appeared on physical education. *Safety in Physical Education in Secondary Schools,* by Frank S. Lloyd, National Bureau of Casualty and Surety Underwriters, New York, is extremely valuable, especially for those responsible for secondary school activities. The second is *Administration of Health and Physical Education,* by Jesse Feiring Williams and Clifford Lee Brownell, Saunders. Everything written by Dr. Williams is well worth reading. This book will be especially useful to heads of physical education departments, and we must commend the idea of the authors in stressing physical education as a health measure.

Nutrition has, as usual, received considerable attention. Everyone will be glad to see a revised edition of the well known book, *The Foundations of Nutrition,* by Mary Swartz Rose, Macmillan, "written for those who wish to live more intelligently." Two books by H. C. Sherman came to hand during the year. *Food Products,* Macmillan, is a 3rd edition so completely rewritten as to be practically a new book. It gives in appendices the Food and Drugs Acts, meat inspection and regulation, mineral content of foods, and vitamins in foods. The second is an entirely new book, *Food and Health,* Macmillan. Needless to say, all that Professor Sherman states is authoritative, and these two books with that by Mrs. Rose give all that the average reader could need on the subject.

Diet and the Teeth, by May Mellanby, His Majesty's Stationery Office, is Part III of a study which has been intensively carried on for 17 years. This part is devoted especially to study on humans.

Food-Borne Infections and Intoxications, by F. W. Tanner, Twin City Printing Co., is an elaborate study of the subjects included in the title. It is of especial value to administrators, domestic science teachers and laboratory men, though all physicians are of necessity interested in the subject. In 1932, a book, *Alcohol and Man,* Macmillan, by 22 authors, was issued under the editorship of Haven Emerson. A smaller book, *Alcohol: Its Effects on Man,* by Haven Emerson, Appleton-Century, is designed for school teachers, high school and college students. Theoretically, prohibition having been repealed, it should be of more use than before.

A number of books on childhood and adolescence have appeared, among which we may mention *The Century Childhood Library,* edited by John E. Anderson, Appleton-Century. There are three volumes, all of which are good. *Healthy Childhood,* by Harold C. Stuart, Appleton-Century, 3rd volume of the series, can be recommended without reservation. It is in many ways the most complete book available on the physical aspects of child hygiene intended for lay readers. *The Road to Adolescence,* by Joseph Garland, Harvard University Press, "deserves wide reading. Helpful in making children of best material and fitting them for life in body and mind." An interesting study is *Idleness and the Health of a Neighborhood,* by Gwendolyn Hughes Berry, New York Association for Improving the Condition of the Poor. This is a social study of the Mulberry Street district, which substantiates the belief that unemployment affects injuriously the health. No correlation was found between unemployment and illness in preschool children. Other publications which will

prove useful and are considered outstanding by some specialists are: *Healthy Babies are Happy Babies,* by Josephine Hemenway Kenyon, Little, Brown; *The Child; His Origin, Development and Care,* by Florence Brown Sherbon, McGraw-Hill; and *Mental Hygiene of the School Child,* by Percival M. Symonds, Macmillan.

A number of books on practice have appeared. It is a temptation to review some of these, since in all contagious diseases, proper care is one of the safeguards against spread.

Miscellaneous: *The Modern Treatment of Syphilis,* by Joseph Earle Moore, Thomas, is an especially good book, which deals also with public health aspects. While we avoid books on treatment, we mention this because the treatment of syphilis is essentially a part of its control. *Contagious Diseases,* by W. W. Bauer, Knopf, is designed for lay readers. *La Lepre,* by E. Jeanselme, Paris, G. Goin et cie, has not been translated as far as we are aware. It is the one book in a foreign language which we mention, and we are doing this on account of its importance. It should be in all libraries. *Nervous Breakdown,* by W. Beran, Farrar & Rinehart, is especially timely on account of the depression. It is an interesting treatment of a misunderstood subject, with prevention stressed. The Milroy Lectures for 1932, with additions, are presented in *Diphtheria; Past and Present,* by J. Graham Forbes, John Bale, sons & Danielsson. It is an excellent and voluminous treatise, and though the material is drawn chiefly from England, the facts are generally applicable. *The Eugenic Predicament,* by S. J. Holmes, Harcourt, Brace, is authoritative and interesting, but pessimistic. *The Teaching of Preventive Medicine in Europe,* by Carl Prausnitz, Oxford University Press, contains the Heath-Clark Lectures for 1932, based on personal observations and documents from the Health Section of the League of Nations.

Two especially interesting books are *The Windows on Henry Street,* by Lillian Wald, Little, Brown; and *A Review of Public Health Realities,* Commonwealth Fund. The first is practically a continuation of Miss Wald's first book, *The House on Henry Street,* from 1915 to date. It is most interesting, and though not an autobiography, gives a good picture of Miss Wald and her remarkable work. The latter, by Dr. Chapin, might well have been put under history. It consists of 16 papers selected from 133 by him. Eight of these were given before the A.P.H.A. or published in its *Journal.* We need hardly add that Dr. Chapin is the outstanding city health officer of the United States, if not of the world. The issue of this book was a labor of love in honor of him.

Red Medicine, by Sir Arthur Newsholme and John Kingsbury, Doubleday Doran, is the story of a trip taken during the summer by the authors. It has been severely criticised on the ground that neither of the authors spoke Russian, and they were shown what the Soviets wanted them to see. However, it is an interesting picture and well worth reading. Of *Chronic Illness in New York City,* by Mary C. Jarrett, Columbia University Press, Professor Boas says: "The first carefully considered review and interpretation of the many aspects of chronic disease, grounded on an adequate factual basis." It is a voluminous study and much of the material is generally applicable. *Blindness and the Blind in the United States,* by Harry Best, Macmillan, is a detailed and comprehensive study, considering among other things, prevention, and the provision made for the blind and their children. *The Physiological Effects of Radiant Energy,* by Henry Laurens, Chemical Catalogue Co., is a masterly and authoritative book, useful chiefly as a text, being too technical

for the average reader. However, considering the various uses which are being made of radiant energy at the present time, and the necessary exposure of many workers to such influences, it is timely.

Somewhat apart from our subject is a most notable publication, the second edition of *Webster's Unabridged Dictionary,* a monumental work. For years Webster has been the standard of this *Journal* on spelling, pronunciation, usage and meaning of words. It is an indispensable aid to an editor or writer. It is published by G. & C. Merriam Co.

This year is the 150th anniversary of the founding of the publishing house now known as Lea & Febiger. During all these years it has remained in the hands of the descendants of Mathew Carey, its founder. For many years it his been exclusively a medical publishing house. In 1820, the journal now known as *The American Journal of the Medical Sciences,* was founded, " with one exception, the oldest medical periodical in the English language." Since 1859, it has been the publisher of *Gray's Anatomy.* Public health as well as medicine in general owes much to this house, which has always maintained the highest standards. The story of the house is told in *One Hundred and Fifty Years of Publishing, 1785–1935,* distributed free by Lea & Febiger, Philadelphia.

Industrial Maladies—*By Sir Thomas Legge, Late H. M. Senior Medical Inspector of Factories and Medical Advisor to the Trades Union Congress. New York: Oxford University Press,* 1934. 234 pp. Price, $4.25.

Dr. Legge's final work was completed by his successor in the office of Medical Inspector of Factories, Dr. S. A. Henry, to whom he left the task of editing. Dr. Legge died on May 7, 1932, at the age of 69. Dr. Henry has prefaced the book with several pages upon the biography, publications, chief attainments and connections of the author. These review the life of a well trained specialist (Oxford, St. Bartholomew's, and Cambridge) who was the first Senior Medical Inspector appointed, and who served in that capacity from 1898 to 1926.

In a methodical manner, the present work takes up the notification (reporting) of industrial disease and poisoning, followed by a chapter on compensation. Then follow in order chapters on industrial diseases caused by bacilli; poisoning by lead, phosphorus and mercury, arsenic, other metals or their compounds, benzene and its compounds, other organic compounds, and other fumes and gases. Industrial dermatoses and eczema, cancer due to pitch, tar, paraffin, and mineral oil, pulmonary disease due to dust, and other industrial diseases—particularly the neuroses, the special senses, and compressed-air-illness, complete the specific and technical discussion.

The final chapter is devoted to health and welfare conditions in factories and workshops, and the book ends with a list of the books and publications of the author (1893 and 1932), and an adequate index. There are 2 color plates, 11 excellent half-tones, 36 tables and 14 charts or graphs. Table 8 is a large infold giving the statistics of compensation from 1908 to 1931 inclusive, and arranged according to the list of 37 compensable afflictions now scheduled for the British Isles.

The reviewer has critically examined many sections of the work and is duly impressed with the vast amount of knowledge and practical experience contained, as well as with the feeling that he is reading a master. While most of the work narrates the author's own experiences and opinions, he has not been hesitant with acknowledgments to others, and citations, which are frequent,

occur at the bottom of the reading page—a decided advantage.

Dr. Legge's familiarity with German—and it should not be forgotten that it was he who translated Rambousek's *Industrial Poisoning* (1913)—brings this phase of Continental European progress to the fore.

Evidently parts of the book have been edited as dictated so that involved statements occasionally occur, as on pages 55 and 57. However, Dr. Henry must be credited with an excellent posthumous editing of a work the context of which he altered as little as possible.

No doubt the work will be found the most adequate for current interest of any from the author's pen and a chief authority under its title. While the total pages are but 234, the printing set-up is compact, albeit easy to read, and the different subjects are commensurably treated in a well bound, handy volume.

The terminology, while medical, is easily within the grasp of the intelligent lay reader and should place the work upon the shelves of industrial, official, and educational libraries, as well as with individuals in several professions where industrial maladies are involved.

EMERY R. HAYHURST

An Introduction to Sex Education —*By Winifred V. Richmond, Ph.D. New York: Farrar & Rinehart.* 312 pp. Price, $2.50.

Dr. Richmond modestly entitles this book "An Introduction to Sex Education," but it offers a broad consideration of the subject as detailed in a series of lectures given to the nurses in the Training School of St. Elizabeths Hospital. The excellent content spreads far beyond the classroom and makes an appeal to the physician or general reader who is anxious to secure a summary of the biology, history, and psychology of sex.

Public health officials, as a rule, take comparatively little cognizance of sex save in terms of venereal diseases. They give little thought to the mental illnesses that are outgrowths of sexual ideas and practices. They spend little time in discussing the problems of masturbation or contraception. From their writings and enactments one would not learn that sex and public health have any common factors. There can be no doubt that the numerous sex problems of today preserve part of the continuity of man's development. Sex is and always has been regarded as a driving force involving erotic pleasure as well as biologic purpose, and dynamically determining vital statistics.

The author senses sex itself as a primary factor, entering at all ages into man's physical, social, and religious organization, although still requiring more careful data for scientific evaluation. Public health officials should begin to sense people in terms of what they are, what they do, and how they are influenced by psychological situations, attitudes, precepts and practices originating in or relating to the sexual impulse. Personality cannot be understood without an appreciation of what it derives from the basic sexual urge—public health cannot ignore the personality.

Public health officials should be particularly interested in the discussions of the problems of sex which involve, not merely fears, perversions and prostitution, but include the sexual factors that break down marriage, promote sterility, or are caught up in the numerous individual and social difficulties bound up in venereal diseases.

No public health official of the present day can deny, even though he ignore, the part that sex plays in the declining birth rate, the rising divorce rate, the spread of contraceptive information, and the establishment of birth control clinics, the emphasis upon a eugenic

program, the control of prostitution, the prophylaxis and control of venereal diseases, the increase of neuroses and psychoses in which sexual problems are involved.

While this book is not written from the standpoint of public health, its pages are crammed with public health implications which should be noted approvingly. The scientific approach to the broad problems of public health must recognize the sexual factor. A thoughtful perusal of this book should lead to more constructive thinking among public health officials—but will it?

IRA S. WILE

Food and Health—*By Henry C. Sherman. New York: Macmillan,* 1934. 296 pp. Price, $2.50.

No well informed person asks why a book was written, if Sherman is the author, but an excerpt from the preface best explains the purpose of this particular one:

> Because the writer, having devoted intensive and extensive study over a fairly long time to the sanitary, the economic, and the nutritional aspects of the food problem, believes that it is now possible to summarize the essentials of all three aspects in a sufficiently coördinated way to guide the reader to well balanced judgments in the daily choice and use of food.

The main body of the book is a summary of the conclusions, as applied to man, that may be drawn from the more recent studies on nutrition. The topics considered may be classified under the four types of metabolism—energy, protein, mineral, and vitamins. The knowledge we have of these subjects was gained by innumerable individual studies, limited almost entirely to the experimental point of view. It is the task of *Food and Health* to correlate the conclusions that may be drawn from these studies so they may find immediate application in dietetic practice. In large measure the correlation is accomplished by the difficult task of quantitative interpretation. As examples of the wide range of subject matter one may find height-weight tables; the number of calories that must be eliminated from the diet to reduce the weight by 1 pound per week; the daily protein requirement; the daily phosphorus requirement; the kind and amount of food required to supply the optimum amount of vitamin A. One of the important contributions of the author is the emphasis placed on the distinction between passable health and buoyant health, between absence of disease and positive health.

The appendices, pp. 207–259, will be exceedingly helpful to workers in various fields of human nutrition. These include: Nutritional Calories in Common Servings and Commercial Units of Typical Foods; Foods as Sources of Protein and Mineral Elements; Foods as Sources of Vitamins; Illustrative Records of Meals. Those interested in the original literature will find the Selected Bibliography very useful, and there is a carefully prepared index.

Another excerpt from the preface indicates the type of audience this book should reach:

> We here attempt to show how the benefits of the newer knowledge may be had without either the restrictions or the fussiness that the term diet too often implies.

This audience might well include that section of the general public which is willing to read an informative book, and all those who have a personal or professional interest in public health.

There is so little in this book that could lead to controversy that the reviewer has some hesitancy in mentioning even one point on which there may be a difference of opinion:

> It is partly for this reason that meat should be eaten sparingly, and when eaten should always be well chewed . . . in the hope that its putrefactive bacteria will be largely killed by the gastric juice.

The reviewer believes the average reader will interpret the word *sparingly* much more narrowly than would a representative group of even our most eminent physiologists.

The printing and make-up are excellent. ALBERT G. HOGAN

Skin Deep: The Truth About Beauty Aids—Safe and Harmful—*By M. C. Phillips. New York: Vanguard Press,* 1934. 254 pp. Price, $2.00.

No competent health official needs to be informed that much of the modern beauty business is a racket. Gullible women are and probably always will be the prey of mercenary vendors of costly and sometimes dangerous cosmetics, unguents, astringents, lotions, and other aromatic chemicals that are flamboyantly, extravagantly, and often erroneously advertised as positive aids to the attainment of female pulchritude.

This book purports to enlighten the public as to the true nature and the frequently insignificant manufacturing cost of many highly touted and expensive aids to human charm. On the whole, it accompiishes this commendable purpose, but like so much of the material emanating from Consumers' Research, the book tends to be more sensational than scientific, and it is written in the blatant and rather supercilious manner that seems to characterize all of the publications of this self-appointed and somewhat unreliable guardian of the welfare of the ultimate consumer.

In its various chapters, this book presents interesting and useful discussions of face powders and cold creams, hand lotions and so-called hair restorers and removers, lipsticks and rouge, deodorants and sunburn remedies, reducing nostrums and similar bunk. One chapter, devoted to diet, contains some weird alleged facts worthy of any faddist. It is unfortunate that such fatuous statements as that salads should be used only occasionally, *"if at all"*; that there are hazards involved in the use of cod liver oil; that milk is over-rated as a food for adults; that glucose is an undesirable form of sugar; and that fruits have little value, should appear in any presumably reputable and authoritative text. Such poppycock is still poppycock, whether it occurs in advertising copy or between the covers of a book.

This treatise, boldly naming names, not only of falsely advertised and occasionally worthless preparations, but also of supposedly decent magazines that carry their advertising, will undoubtedly be popular, and deservedly so. Despite its defects, the book contains material of general interest and value. If it helps to bring about some reforms in trade practices, and aids in promoting better legal control of cosmetics, it will have served a useful purpose. The reader will do well, however, to omit the chapter on diet and turn to Sherman, Rose, McCollum, or some other real authority for authentic information on this important topic.

JAMES A. TOBEY

Clinical Laboratory Diagnosis—*By Pauline S. Dimmitt, Ph.G. Philadelphia: Davis,* 1934. 156 pp. Price, $2.00.

This book is merely a running outline of the essential steps necessary in the performance of a wide variety of clinical laboratory tests. In fact, it is designed for the teaching of brief and probably inadequate courses in laboratory technic to internes and medical technicians. It fails to include any basic theoretical groundwork and proceeds entirely by rule of thumb. It will be found of little value to the worker in a public health laboratory since it is woefully weak in the exposition of those tests routinely applied in public health work.

EARLE K. BORMAN

The Life of Sir Robert Jones—*By Frederick Watson. Baltimore: Wood,* 1934. 318 pp. Price, $3.75.

As with all men, the career of Robert Jones was the result of a combination of circumstances and personal qualities which had never occurred before and never will again. The account of his career, written by his son-in-law, reads like a romance and is, in fact, far more interesting than most of the fiction which is being put out at the present time.

Born in 1857, the son of a London journalist, Robert Jones was aided in getting a medical education by an uncle, Hugh Owen Thomas. Thomas was an eccentric genius, but an exceptionally well trained and successful orthopedist of Liverpool, the son of a celebrated bone-setter.

After his graduation in medicine, young Jones practised with Thomas for a time and then set out for himself. In 1888, at the age of 31, he was made Surgeon Superintendent of the Manchester Ship Canal, and put in charge of the health, surgical work, and hospitals required for the 20,000 laborers and their families located along the route of the canal during the 8 years of its construction. Here he gained invaluable experience, especially in emergency surgical work.

Jones was a rapid as well as a skillful operator. On the occasion of a visit to Liverpool by the American College of Surgeons in 1914, he carried out a program of 52 operations in the time ordinarily taken by Americans for 5. It was nothing unusual for him to see 250 patients in a day.

Dr. William Mayo said that Jones was one of the very greatest surgeons he had ever met. Lord Moynihan said:

> As an operator he is among the greatest. His technic is flawless, yet simple. His movements show the closest familiarity with every detail of the structural and functional anatomy of the part and are of the highest excellence in craftsmanship. . . .
>
> His manipulation of a limb might be a demonstration of the immense power which a man of great strength can apply almost ruthlessly when the occasion demands it, or of the most exquisitely gentle and tender caress when only a slight touch is needed. The most stubborn deformity seems by degrees to become subservient to his will, the most obstinate fracture slips nimbly into alignment.

Under Jones's care, cures resulted in a large number of cases which were formerly treated for months and years by orthopedic apparatus, often with unsatisfactory results. Although a skillful surgeon, he was loath to operate unless necessary. He advocated continued care and follow-up until the patient was cured, although this might take a long time. Jones shortened the time for the patients by providing technical occupations for them and substituting an air of cheerfulness in his hospitals for the atmosphere of despondency and gloom of earlier days.

At the outbreak of the World War, Jones placed his services at the disposal of his country and succeeded in obtaining a wide acceptance of his methods in the field and in the hospitals at home. Through his efforts many large special hospitals were established with the object of restoring injured limbs as far as possible and teaching the patients useful occupations suited to them. His contributions to his science place countless persons in his debt who never heard his name.

In later life the prevention as well as the cure of deformities in children claimed much of Jones's attention, and through his efforts centers for the examination and treatment of the youth of the land were established all over England. Rickets and tuberculosis being frequent causes of deformity, he became a crusader for better housing and purer milk supplies.

Jones fought valiantly for the ac-

ceptance of the principles and methods which he knew to be right. He wrote many articles and books, some of which were promptly recognized by the medical profession as marking an advance in the science of orthopedics and all of which were authoritative.

Honors came to him thick and fast. He was created a Major General, was knighted, and received recognition from a number of European institutions and governments. Yale, Harvard, McGill, and Smith conferred degrees upon him. From the United States he received the Distinguished Service Medal.

Death came to him at the age of 76. His remains lie in the cathedral at Liverpool. GEORGE A. SOPER

Birth Control, Its Use and Misuse—*By Dorothy Dunbar Bromley. New York: Harper,* 1934. 304 pp. Price, $2.50.

Nothing better on the use and misuse of modern medical knowledge of contraceptive procedures has appeared in good English from the hand of any non-medical author.

Here we have accuracy and readability in a text addressed to the general public and free from cant, propaganda, or any form of intellectual dishonesty.

There is obvious sincerity of purpose, a thorough understanding of the subject, a gift at simple description, and a degree of common sense and decency in every chapter.

A topic, banned by federal law as obscene since 1873, taboo by religious edicts until recently, feared by physicians from lack of professional education in it, ignored by our health officers, made complex and costly by commercial charlatans, appears simple and clean in the words of this author.

The marvel is that legislators of states and the Nation can so long linger in the dark doubts of other generations in their official attitudes. Some generous social angel might illuminate their minds by a gift of this book to the wife of each married legislator now in office.

It is certainly to be hoped that we may swiftly follow the example of England, Germany, Holland, and the Scandinavian countries, by including marriage counselling, or merely birth control advice, among the functions of maternal health centers of local health departments, with this little book as a sort of lay *vade mecum.*

HAVEN EMERSON

Handbook of Chemistry and Physics—*Compiled and edited by Norbert A. Lange, Ph.D. Sandusky, O.: Handbook Publishers, Inc.,* 1934. 1265 pp. and an appendix of 248 pp. of mathematical talks and formulae. Price, $6.00.

This is the most complete chemical handbook which has as yet come to the attention of this reviewer. It should be of value as a source of chemical, physical, and mathematical data not only to the chemist and chemical engineer but also to the public health laboratory worker.

In addition to the usual tables of chemical and physical constants and factors there is included a wealth of information on subjects which are of interest to the worker in the field of public health. Among such material may be found tables on composition of foods, the vitamins, composition of milk, ice cream ingredients, milk solids, lactometer corrections, typical water analyses, drinking water standards, water softening formulae, and algae.

The list of trade names of chemicals with the corresponding synonyms and formulae and the table of hazardous chemicals, giving usual methods of shipping, storage, and common hazards are well worth mentioning.

The section devoted to hydrogen ion determinations is unusually complete. The arrangement of the table of gravimetric factors is a most practical one

and the table of conversion factors shows not only a sensible alphabetic arrangement of units, but is unusual in its completeness. Considerable engineering information relating to heating, ventilating and hydraulics has been included. A list of definitions of pharmaceutical preparations and therapeutic terms has been added to the usual list of definitions of chemical terms.

To the worker without ready access to various chemical, physical, engineering, and mathematical tables this handbook is to be recommended.

CARYL C. CARSON

Swimming Bath Water Purification —*By Wilkinson and Forty. (2nd ed.) London: Contractors' Record, Ltd.*, 1934. 262 pp. Price, $3.75.

No American book compares favorably with this volume in covering its subject. The best British practice and objectives are seen, as condensed in this most practical exposition, to be so like ours that the book has a usefulness for operators, managements, and officials charged with sanitary supervision of our indoor and outdoor pools.

The cautious treatment of the relationship of pools to disease merits perusal. Sanitary expediencies and controls are emphasized throughout. Routine operating tests are fully explained and a good round basis for comprehending the full significance of each step of purification is made clear for the layman.

The workings are minutely described for not only the recirculation, filtration, and chlorination devices which are essentially standard for both countries, but descriptions are given of chloramine, ultra-violet ray, Electro-Katadyn, and automatic "Photochlortrol" chlorination equipment, also automatic "Chlortest" free chlorine tester, and commercial manual testing equipment for turbidity, free chlorine, and alkalinity.

Standards include the dictum that the bacteriological content of the water should approximate that of drinking water and that free chlorine should be maintained continuously between 0.2 and 0.5 p.p.m., preferably toward the higher limit, in which case there is normally no need of further routine testing. Chloramine sterilization is given prominence but no great emphasis is given to its slower action than chlorine. The reviewer is not ready to concur unreservedly in the statement that "There is now general agreement that the most efficient, convenient, and generally satisfactory method of continuous chlorination of re-circulated swimming bath water is by means of chlorine gas which is capable of being administered at an unvarying standard of strength and potency, *continuously*, in accurately dispensed quantity, and under *perfect* and instantaneous control" (Reviewer's italics). The incomplete concurrence arises from the desire not to discourage any promising development of application of hypochlorites.

The book is excellently printed and illustrated, with an abundance of diagrams and photographs of equipment.

CHARLES L. POOL

The Vitamin B Requirement of Man —*By George R. Cowgill. New Haven: Yale University Press, for Yale Institute of Human Relations*, 1934. 261 pp. Price, $4.00.

This is a scholarly report on extensive experimental, mathematical, and historical researches on vitamin B and beriberi, conducted by the author and his associates at Yale University during a decade.

Since beriberi is essentially a public health problem, this book, which clarifies the underlying issues and makes important contributions to the control of this disease, will be of particular interest to readers of this *Journal*. The

broad scope of this book is indicated by the following highly condensed chapter headings:

The problem; discussion of beriberi, its incidence in various countries and times; critique of animal experiments; experiments on pigeons, dogs, rats, mice; comparison of data yielded by different species; mathematical formulae relating vitamin requirements to body weight within species and between species with extrapolations to humans; the influence of energy metabolism (exercise, hyperthyroidism, etc.) on vitamin B needs; vitamin B contents and vitamin to energy ratios of different foods; comparisons of author's vitamin B units with published units and results; vitamin B content in diets not associated with beriberi; sex and age incidence of beriberi; explanation of association of beriberi with malaria and diarrheal conditions, with gastrointestinal and heart disorders, anorexia, anemia, etc.; summary; bibliography; index.

The tables giving amounts of vitamin B present in different foods and vitamin to calorie ratios and the historical and critical discussions of various dietaries in all parts of the world will be of practical value to public health workers, clinicians, dieticians, as well as to investigators in nutrition.

The author has quoted and carefully analyzed many dietaries from European, Asiatic, African, and American countries, and has given special attention to dietaries in war prison camps, jails, asylums, etc., where "institutional diseases" are often found. From his analyses of these data it appears that no matter how poor the diets are in other respects, beriberi will not appear unless the vitamin to calorie ratio falls below a certain critical level. This apparent constancy of vitamin to energy metabolism is, in the reviewer's opinion, the most important generalization of the book. The quoted data on the influence of exercise, fever (as in malaria), hyperthyroidism, etc., on the development of beriberi leave no doubt of the existence of an intimate relation between energy and vitamin B metabolism.

The author's equations are too complicated for review. Their central idea is that vitamin B needs of *mature* animals of different species (mice, rats, pigeons, dogs, and apparently humans) increase with the 2/3 power of body weight, so that one equation can represent the vitamin B requirements of all mature animals including humans. This equation is further generalized to include growing animals by multiplying the 2/3 power equation

$$(\text{vitamin} = K(\text{weight})^{2/3})$$

by the ratio of given body weight to maximum (mature?) body weight. In this connection it may be pointed out that the reviewer, using the method of least squares, obtains somewhat different values for the exponent of the weight for the species studied than Cowgill's 1.66, namely, 2.27 for mice, 1.75 for rats, 1.74 for pigeons and 1.69 for dogs. However, the author was probably justified in employing the 1.66 value for purposes of generalization.

This book makes an important contribution to technic by pointing out that anorexia is usually the earliest symptom of vitamin B deficiency, and by using this symptom for measuring vitamin B deficiency in diets. This fact has wide clinical application, especially in the feeding of marasmic infants and convalescents from fevers. Readers of this *Journal* will be grateful for the careful organization of the available knowledge relating to vitamin B and its deficiency diseases by an original and fruitful investigator.

SAMUEL BRODY

Children of Preschool Age—*By Ethel Kawin. Chicago: University of Chicago Press,* 1934. 340 pp. Price, $3.50.

This report from the Behavior Research Fund and Institute for Juvenile Research in Chicago gives the results of studies in socio-economic status, social adjustment, and mental ability, with illustrative cases. The descriptions of

the nursery school and clinical services are clearly presented. The book should be helpful to anyone contemplating nursery school development, as well as a useful reference for those attempting to develop research at the preschool age level within a service program.

IRA V. HISCOCK

Community Hygiene—*By Laurence B. Chenoweth, A.B., M.D., and Whitelaw Reid Morrison, A.M., M.D. New York: F. S. Crofts & Co.*, 1934. 317 pp. Price, $2.50.

This book represents a crystallization of lectures to college students, and emphasizes especially measures for the control of communicable diseases. The excellent illustrations form one of the best features, many representing Ohio conditions, which add interest to the descriptive text. Selected references are appended to each chapter as a guide for more extended reading in various subjects. A brief glossary contains definitions "somewhat simpler than those given in the medical dictionary."

In general, the chapters are well written and include practical discussions of various aspects of preventive medicine and public health administration. One may wish that the definition of pasteurization were in accord with modern practice, and that a more representative picture of city health administration could have been given. But aside from a few details of this nature, the book has merit, and should prove to be a useful college text.

IRA V. HISCOCK

Microbiology and Elementary Pathology for the Use of Nurses—*By Charles G. Sinclair, M.D.* (2nd ed.) *Philadelphia: Davis*, 1934. 377 pp. Price, $2.75.

In general the material presented is in good form, good diction, and well organized, but entirely too ambitious for the general garden-run of nurses. This probably is not a legitimate criticism because there is always a question of what a nurse should be taught to make her a competent aid to the physician, and not his competitor. The more one sees of the training to which nurses are exposed the more he obtains the impression of inadequacy of that training.

While burdening the nurse with such things as the establishment of pébrine as a germ disease, too little emphasis is laid on the preparation of hands of operators and nurses and the site of the operation. The need, if not necessity, of running water for general cleansing is not mentioned.

There are a number of questionable terms and statements used, several improper statements and misleading impressions given, which markedly detract from the scientific value of the book; for example:

"Bacteria grow without the *aid* of chlorophyl"; "Ciliated epithelium which *covers* the bronchi"; "Thermal death point of bacteria of 65 to 70° C." (Time element and type of heat not mentioned); "Simple stains are merely weak *alcoholic* solutions of aniline *basic* dyes"; "Specimens." "Pus . . . may be . . . *inoculated* on to glass slides"; "The laboratory diagnosis of diphtheria includes bacteriological diagnosis . . . virulence tests, . . . *and the Schick test;* "The war"; "Bacillus botulinus is found *in* fruits and vegetables"; "Overproduction of the parathyroid, (*hyperthyroidism*) will raise the serum calcium level"; "The beef tape worm has segments . . . 5 *centimeters* broad"; "Blood smears made by thinly *smearing* the drop of blood over a slide"; "*Absence* of insulin (as in diabetes)."

It is stated that the Widal test is of little value when the serum is from patients previously immunized against organisms of the typhoid group. This is far from true if the test is repeated at 3–5 day intervals, when by a stationary or changing curve the most valuable interpretation to be had by this method is shown. The agglutination titer progressively rises during the

activity of the typhoid or paratyphoid fever, irrespective of previous immunization. Diphtheria of wounds is not mentioned. Under the title, "Laboratory Diagnosis of Bacillary Dysentery," occurs the dangerous statement, "The laboratory may aid in the diagnosis of bacillary dysentery by a microscopic study of the cytology of the feces—the number and kinds of tissue, pus and blood cells there." In the discussion on immunity much is made of the use of the toxins in prophylactic immunization against scarlet fever. The wide usage credited to this procedure is questioned.

Under the causes of hypoglycemia, no mention is made of that occurring under excess of body prepared insulin as seen in some tumors of the islet cells of the pancreas. In the chapter on tumors occurs a statement that no student of oncology would accept: "There are forms of tumors *midway* between the sarcomas and the benign connective tissue tumors to which a combined name is given: fibrosarcomata, chondrosarcomata, osteosarcomata." The combined names represent that these are sarcomas and of the type cell as designated. There is no midway station—tumors are either benign or malignant, and the combined terms as used represent malignant tumors derived from elements whose names appear in the terms.

The printing and make-up of the book are good. M. PINSON NEAL

Textbook of Materia Medica and Therapeutics—*By A. S. Blumgarten, M.D. (6th ed.) New York: Macmillan,* 1934. 791 pp. Price, $3.00.

Too bad this text was not used in teaching Materia Medica when we were student nurses. We would have been saved much confusion and despair. The author states that most texts on this subject are too technical, and we agree. Here is a physician who is a real teacher. He knows that a little knowledge of normal physiology is necessary for an understanding of the drug presented. He knows that the effect of a drug is principally the thing a nurse should know about it, and the site of action is of secondary importance; what a drug does rather than where it does it.

He even begins with drugs that have simple actions which a nurse can easily understand, then goes on to those that stimulate gastric juice, then cathartics, then drugs which act upon the blood, etc., ending up with drugs acting on the nervous system.

In my opinion the text is far the best in its field on the market. The two nursing schools we have visited since receiving the book to review were using it as a text, and it is probably safe to say that it is more widely used than any other. It is to be recommended without reservations.

EVA F. MACDOUGALL

Text-Book of Meat Inspection—*By Robert V. Ostertag. Chicago: Alex Eger,* 1934. Price, $10.00.

This is an entirely new book superseding and replacing the classic, *Ostertag's Handbook of Meat Inspection.* In his Preface, Professor Ostertag points to the success of his *Handbook,* which has gone through 9 editions in German and 4 in English, and explains his reasons for writing a new book instead of issuing a new edition of the old one. He felt that the textbook could be made more concise and give more attention to essentials, making it more useful to veterinarians. He holds that the value of the Handbook as a source of material remains unimpaired. The English editor, with the permission of the author, has reduced the size of the book by cutting out portions of the German edition, chiefly history, German legislation and German references. He has also added a chapter on poultry.

It is hard to speak too highly of this

work. Professor Ostertag has for many years been recognized as the greatest veterinary authority on meat inspection, and there are few people in any country capable of criticising his work. The book before us goes into the usual subjects found in a book on meat inspection, and gives an especially thorough description of the physiological conditions which are important. There is a chapter discussing the General Pathology of Slaughtered Animals Relating to Sanitary Science. Other chapters discuss Regional Diseases; Blood Anomalies; Intoxications and Auto-Intoxications; Animal Parasites; and Infective Diseases. A chapter is devoted to the use of agglutinants in sausage, the adulteration of meat, coloring and inflation.

There are a good index, and 12 appendices, a number of which are devoted to the laws and regulations in force in England. These concern slaughter, slaughter houses, food regulations, definitions of such terms as "cattle," "meat," "animal," etc.; General Observations for the Guidance of Inspectors and Butchers; Meat marking, Shops, Stores, Stalls, etc.; the use of preservatives, dyes, samples for analysis, and various other matters. Appendix XII is devoted to Regulations Governing the Meat Inspection of the United States Department of Agriculture. It will be seen that the book as issued in this country and England is especially designed to meet the uses of English and American veterinarians and food inspectors. The chapter on Animal parasites occupies 80 pages, and that on Vegetable Parasites, really a treatise on infectious diseases, 203 pages.

The book is well printed and bound. The illustrations are abundant and good, many of them being in colors. The reproductions of the plates are excellent. This book can be recommended without reservation. While intended chiefly for the veterinary profession it is a standard reference for health officers and all engaged in the handling and inspection of foods. There can be no doubt that it will have a success comparable to the author's *Handbook of Meat Inspection.*

MAZÝCK P. RAVENEL

The Mother's Encyclopedia—*Compiled and Edited by the Editors of the Parents' Magazine. New York: Reynal & Hitchcock,* 1934. 959 pp. Price, $3.00.

On first thought one would hardly turn to an encylcopedia to learn how to bring up a child; but really in this instance the editors have done a pretty good job.

The subject matter consists of short articles by 130 authors (if my count is correct), many of them of national reputation. The unavoidable lack of continuity is balanced by the excellent system of cross references, a full subject index, and a table of contents grouped by age interest. The articles themselves are arranged alphabetically according to subject. Lesser but real advantages are good paper and type and flat opening. MERRILL E. CHAMPION

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

Conserving Drinking Water—Inaugurating a series of abstracts of the report of the Water Planning Committee of the National Resources Board, this article presents an interesting picture of the meteorological conditions of the United States including a pictorial representation of the depths of mean annual precipitation.

BRUSH, W. W. Controlling Water Resources. Water Works Engineering, 88, 3:115 (Feb. 6), 1935.

Over a Century of Urban Tuberculosis History—An interesting and valuable review of tuberculosis mortality in American cities, and the social, economic and public health changes which probably influenced the course of that disease.

COLLINSON, J. The Trend of Tuberculosis Mortality in Baltimore and Eight Other Cities, 1812–1932. South. M. J. 27, 12:992–1002 (Dec.), 1934.

Tuberculous Infection and Immunity—Epidemiologic evidence is presented which leads this Welsh author to conclude that relative immunity is acquired by mild tuberculous infection, though principally in those racial stocks long tuberculinized. It is pointed out editorially in the same issue that this conclusion is not in accord with the opinions of some American writers who now feel that tuberculin sensitization may well be regarded as a two-edged sword.

CUMMINS, S. L. Contact With Infection in Tuberculosis. Canad. Pub. Health J. 26, 1:1 (Jan.), 1935.

For Pension Planners—About 17 per cent of the population is over age 50; and 5.4 per cent over age 65. In 1920 only 4.7 per cent fell into this latter class. The population is rapidly aging. Some of the New England States have nearly 9 per cent over age 65.

CUMULATIVE AGE GROUPS, BY STATES, FOR THE POPULATION 45 YEARS OLD AND OVER. Bureau of the Census. Washington (Dec. 28), 1934. (A distribution by color, age, and sex was issued Nov. 20, 1934.)

Fluorides and Teeth—From studies in West Texas, it now appears that cattle, too, may develop mottled tooth enamel when water rich in fluorides is used for drinking.

DEAN, H. T. Mottled Enamel in Cattle. Pub. Health Rep. 50, 7:206 (Feb. 15), 1935.

While Colds Go Merrily On—The conclusion that no specific measure has as yet been shown to be of sufficient value, for the prevention of colds to justify its indiscriminate use, though general measures carefully carried out seem effective in reducing colds among "cold susceptible" groups, follow logically, if not hopefully, upon this review of the present-day status of cold prevention and treatment.

DIEHL, H. S. The Common Cold. New York State J. Med. 35, 3:109 (Feb. 1), 1935.

In the Cause of Social Hygiene—Summarizing the reports of social hygiene activities of official agencies and voluntary groups in the 48 states in 1934, the picture presented is encouraging in certain respects. Though suffering from limitations of funds, a surprising number of agencies are doing business as usual.

EDWARDS, M. S., and PINNEY, J. B. Notes on the American Social Hygiene Scene 1934. J. Social Hyg., 21, 2:49 (Feb.), 1935.

For Improving on Ward Statistics—A highly practical manual on ar-

ranging for permanent statistical areas within cities, to insure continuity of data in spite of ward changes. Very timely in the light of the possible federal census in 1935.

GREEN, H. W., and TRUESDELL, L. E. Census Tracts in American Cities. Bureau of the Census. Washington (Dec.), 1934.

In One of the Wealthy Counties—Under the aegis of the County Medical Society and the Parent-Teacher Association, a scheme to examine children aged 2 to 5 was undertaken in Westchester County (N. Y.). Almost all of the 1,000 children examined needed medical attention. Only a few had been immunized against diphtheria or tuberculin tested; nearly a quarter had knock-knees and weak feet; and many behavior abnormalities were found.

HALL, F. Westchester County Child Health Examination Program. New York State J. Med. 35, 4:172 (Feb. 15), 1935.

The Price of Future Progress—How the status of public health administration may be restored at least to the position it held before the depression is the topic of this discussion addressed directly to voluntary health organizations, but with implications for all leaders in public hygiene.

HISCOCK, I. V. Rehabilitation of Health Work in the United States. Yale J. Biology & Med. 6, 6:1 (July), 1934.

Protection against Poliomyelitis—Twenty-five children were vaccinated with a ricinoleated poliomyelitis vaccine. None showed any ill effects and all showed an increase in antibody in the blood after vaccination. The authors feel they have a suitable vaccine for use particularly during epidemics.

KOLMER, J. A. *et al.* A Successful Method for Vaccination Against Acute Anterior Poliomyelitis. J.A.M.A. 104, 6:456 (Feb. 9), 1935.

Biting Flies from Sewage Filters—In the trickling filter bed of a South Carolina Sewage treatment plant, stable flies were found breeding in great numbers. Flooding the filters twice a week for 12 hours solved the nuisance problem without damaging the nitrifying bacteria.

NETTLES, W. C. Checking an Outbreak of Stable Flies at Sewage Plant. Munic. San. 6, 2:36 (Feb.), 1935.

The Significance of the Colon-aerogenes Group—In stored feces, typical *B. coli* tended to disappear and were replaced by intermediate types, and then by typical aerogenes group. However, in some specimens, typical *B. coli* remained for a long period. The assumption that organisms of the aerogenes type, isolated from water supplies, come from grains or soils, and not from feces, is untenable.

PARR, L. W. Sanitary Significance of the Succession of Colon-aerogenes Organisms in Feces. Proc. Soc. Exper. Biol. & Med. 32, 4:580 (Jan.), 1935.

Amebic Dysentery and Food Handlers—Research is described which indicates that carriers of amebic dysentery do not frequently contaminate their hands with viable organisms under ordinary conditions. From this it is concluded that contamination of food by food handlers must occur infrequently.

SPECTOR, B. K., *et al.* Endamoeba Histolytica in Washings from the Hands and Finger Nails of Infected Persons. Pub. Health Rep. 50, 6:163 (Feb. 8), 1935.

What Staphylococci Are Implicated in Food Poisoning?—The question whether staphylococci causing food poisoning constitute a peculiar group must be answered in the negative, so long as our present differential methods remain with existing limitations, is the finding of this research.

STRITAR, J., and JORDAN, E. O. Is a Special Variety of Staphylococcus Concerned in Food Poisoning? J. Infect. Dis. 56, 1:1 (Jan.-Feb.), 1935.

Our Maternal Mortality is Excessive—About 1,000 certificates involving maternal deaths were sent to 16 foreign countries for classification. The differences in method of classification were found insufficient to account for the relatively high maternal mortality rate in the United States.

TANDY, E. C. Comparability of Maternal Mortality Rates in the United States and Certain Foreign Countries. Children's Bureau. Washington. *Bureau Pub. No. 229*, 1935. 5 cents.

Results of Sanatorium Care—The follow-up of 2,000 patients discharged from tuberculosis sanatoria finds half returned to work and leads to the conclusion that results of sanatorium care are encouraging.

WHERRETT, G. J. Follow-Up Information on 2,031 Tuberculosis Patients One to Thirteen Years After Discharge from Sanatoria. Am. Rev. Tuberc. 31, 1:62 (Jan.), 1935.

Vitamin D Milk—Some rachitic infants were fed irradiated milk, others milk from yeast-fed cows. There was no indication of any difference between the two milks in their antirachitic effectiveness.

WYMAN, E. T., *et al.* A Comparison of "Yeast Milk" and Irradiated Milk in the Treatment of Infantile Rickets. New Eng. J. Med. 212, 6:257 (Feb. 7), 1935.

BOOKS RECEIVED

A TEXTBOOK OF NURSING TECHNIQUE. 2nd ed. By Marion L. Vannier and Barbara A. Thompson. Minneapolis: University of Minnesota Press, 1935. 265 pp. Price, $2.50.

MAKING OUR MINDS BEHAVE. By William S. Walsh. New York: Dutton, 1935. 269 pp. Price, $2.50.

VITALITY. By Boris Sokoloff. New York: Dutton, 1934. 183 pp. Price, $2.00.

COMMUNICABLE DISEASES FOR NURSES. 3rd ed. By A. G. Bower and E. B. Pilant. Philadelphia: Saunders, 1935. 420 pp. Price, $3.00.

MOUTH INFECTION. Clinical Histories. By Oliver T. Osborne. New Haven: Author, 1934. 119 pp. Price, $2.00.

ELEMENTARY HUMAN ANATOMY. Based on Laboratory Studies. By Katharine Sibley. New York: Barnes, 1935. 380 pp. Price, $4.50.

PSYCHOLOGY AND HEALTH. By H. Banister. New York: Macmillan, 1935. 256 pp. Price, $2.50.

GROWTH AND DEVELOPMENT OF THE YOUNG CHILD. 2nd ed. By Winifred Rand, Mary E. Sweeny and E. Lee Vincent. Philadelphia: Saunders, 1934. 429 pp. Price, $2.75.

NUTRITION AND PHYSICAL FITNESS. 2nd ed. By L. Jean Bogert. Philadelphia: Saunders, 1935. 566 pp. Price, $3.00.

THE ART OF PUBLIC HEALTH NURSING. By Edith S. Bryan. Philadelphia: Saunders, 1935. 296 pp.

SURGICAL DISEASES OF THE CHEST. By Evarts Ambrose Graham, Jacob Jesse Singer and Harry C. Ballon. Philadelphia: Lea & Febiger, 1935. 1070 pp.

HEALTH DENTISTRY FOR THE COMMUNITY. By The Committee on Community Dental Service of the New York Tuberculosis and Health Association. Chicago: University of Chicago Press, 1935. 85 pp. Price, $1.00.

SING SING DOCTOR. By Amos O. Squire. Garden City: Doubleday, Doran, 1935. 296 pp. Price, $2.50.

HYGIENE AND SANITATION. 3rd ed. By Jesse Feiring Williams. Philadelphia: Saunders, 1935. 372 pp. Price, $2.00.

PRINCIPLES OF GENETICS AND EUGENICS. By Nathan Fasten. Boston: Ginn, 1935. 407 pp. Price, $2.80.

GUIDING THE CHILD THROUGH THE FORMATIVE YEARS FROM BIRTH TO AGE OF FIVE. By Winifred de Kok. New York: Emerson Books, 1935. 191 pp. Price, $2.00.

CONSERVING THE SIGHT OF SCHOOL CHILDREN. A Program for Public Schools. Report of the Joint Committee on Health Problems in Education. New York: National Society for the Prevention of Blindness, 1935. 54 pp. Price, $.35.

Skyline of Milwaukee

MILWAUKEE—OUR 1935 CONVENTION CITY

ON to Milwaukee and the Sixty-fourth Annual Meeting, October 7 to 10, 1935.

Magnetic Milwaukee, nestled in a broad expanse of bay, a part of Lake Michigan, one of the chain of lakes which holds half of the fresh water of the world, possesses a charm that has made it a successful convention city.

Milwaukee's recognition as a famous gathering place and as a center of genuine hospitality can be traced back through generations of red-skinned braves. Indian legend tells us that the name Milwaukee was first uttered as a naïve guttural cry of an Indian warrior as "Mahn-a-waukie" as he drew his bark canoe from the waters at the present site of the city. This name in the Ouisconsin language means "good and beautiful lands." In different dialects other Indians are known to have called this spot "Mahn-a-waukie Seepe" or translated "gathering place by the rivers."

Shortly after the first Indian came to Milwaukee more and more tribes followed. They answered a beckoning message on the shores of Lake Michigan—a signal fire with a lone column of smoke, a bronzed figure standing nearby waving a blanket—this, the recognized Indian symbol for hospitality and friendliness served to draw the warriors to a natural meeting place.

Soon this early Milwaukee was a village of tepees; a village inhabited by warriors who had buried their warring hatchets, washed the war paint from their faces and lived in peace and contentment where the three rivers—the Milwaukee, Menominee, the Kinnickinnic—brought the beaver, muskrat, the mink, and the otter to the waiting traps of Milwaukee's first residents.

Today, Milwaukee is the metropolis of Wisconsin, the twelfth most populous city in the United States. In the last decade its population has increased 121,000 and Milwaukee County, in its 141 square miles, has a population of 725,263.

The same spirit of friendliness and hospitality is common today among Milwaukeeans. Today there are no signal fires, nor bronzed figures, but in place of these there are thousands of smoke stacks of industry and many buildings towering into the sky with flags unfurled—symbolizing a great city with a great spirit.

Some two hundred years ago, Pere Marquette and Louis Joliet, on the way to the discovery of the Mississippi River, passed along the west coast of Lake Michigan and marked the site of

The Milwaukee Auditorium is located in the center of the hotel, theatre, and shopping district and is one of the most complete and serviceable buildings of its kind in America.

Milwaukee on their map. This map bearing the name of Milwaukee Bay is now in the possession of a convent in Montreal.

With the coming of the white man the Indian village grew into a thriving trading post, its strategic location giving it importance in the primitive commerce. In 1795 Jacques Vieau established a trading post for the Northwestern Fur Company.

Milwaukee traces its development as a city to the time when Solomon Juneau purchased a small trading post from his father-in-law, Vieau, in an Indian village in the year 1818. Other pioneers banded together under the leadership of Juneau and were quick to capitalize on the advantages of the village's location for the development of industry and commerce.

The pioneers of Milwaukee, like their contemporaries in other sections of America, were generally able to handle their work unaided. But they joined together in the general spirit of coöpera-

The Lincoln Memorial Drive which stretches from downtown Milwaukee along the lake to the fashionable east side residential section follows Lake Michigan's edge through many parks and beaches. This view shows Water Tower Park and the Bradford Beach Pumping Station.

tion and worked for the combined interests and welfare of their neighbors, and thus the village prospered.

Along in the middle 30's Milwaukee suffered from an era of speculation, due to the high enthusiasm about all manner of public improvements. Roads were ordered and charters were granted to railroads. This was a little rash and prices mounted and real estate suffered. However, such men as Solomon Juneau made good on the pledges they had made and prices were soon restored to fair value.

Rival settlements known as Milwaukee East Side and Milwaukee West Side, popularly called Juneau Town and Kilbourn Town, were separately incorporated as townships of Milwaukee County in 1837. Two years later they were united as wards of the same village, each one keeping complete administration records of its own. Walker's Point on the south side of the city, was annexed as a third ward, and in 1846, the three were incorporated as the city of Milwaukee, and Solomon Juneau was elected the first mayor.

The first newspaper, the *Milwaukee Advertiser*, began publication on July 14, 1836, and a public school was also opened in that year.

In 1839, the Fire and Marine Insurance Bank was established. This bank for 40 years was one of the strongest banking houses west of the Alleghanies. Its notes passed at par through the panics when even government issues depreciated. It financed the Milwaukee Railroad and other railways.

The first connection with Chicago by Telegraph was established in 1849; by railway in 1856. About 1840 a stream of immigration from Germany began, which was accelerated by the revolutionary movement in 1848, and continued through half a century.

In 1900 out of a total population of 285,315, the number born in Germany was 53,854; 151,045 more had one or both parents of German birth. This made a total of 75 per cent who were either German by birth or of the first generation.

Its traditions are rich—its people are hospitable, yet it enjoys even greater advantages as a convention city. It is easy to get to Milwaukee for it is central to the northern part of the United States. Conventions held here impose surprisingly low travel burdens upon entire delegations, for it is said that more convention-going people live within a day's ride of Milwaukee than any other city in the United States, with possibly several exceptions.

Come to Milwaukee by an overnight train ride or less; by motorcar over a network of fine hard-surfaced highways; by steamship over Lake Michigan which affords automobile transportation and overnight service; by airplane over Lake Michigan, or overland and arrive at a modern municipal airport only 3 miles from downtown Milwaukee.

Convention Headquarters: Schroeder Hotel

Matthew Keenan Health Center, Milwaukee, Wis.

You will enjoy Milwaukee! We view it as a bustling workshop—one of America's greatest production centers. With this scene of great activity and industrial progress, Milwaukee has maintained its pleasing picturesqueness which through years has endeared it to visitor and dweller alike.

Nature has provided a beautiful setting, and Milwaukee citizens, while building up large and diversified industries have not been insensible to the appeal of beauty.

The Milwaukee River flowing through the heart of the business district gives to the city a graceful charm. Its waters teem with commercial crafts; its banks are lined with industrial plants; picturesque bridges span this stream and atone in whatever measure necessary for the ravages of commerce.

Delegates and visitors to this Sixty-fourth Annual Meeting will enjoy the farsightedness of Milwaukeeans who planned Milwaukee's business area. You will like especially the way in which the hotels, theaters, restaurants, stores, and Auditorium are all situated conveniently to each other.

Milwaukee has many parks and playgrounds scattered throughout the city covering an area of more than 1,500 acres. These parks offer a variety of interesting scenery and recreation. The city is also circled by a park development plan which follows the lake shore, and the courses of the rivers and a wide concrete driveway extends along 5 miles of the lake shore from Juneau Park in downtown Milwaukee to Lake Park near the north limits.

It is a city of homes and home-loving, pleasant folk. Beautiful residential districts in all parts of the city bear evidence to this fact.

Milwaukee, with its natural advantages for commerce, has arisen rapidly as an industrial center. Today it ranks first in more than 20 important lines of manufacturing in the United States. It is one of the largest steel casting centers and has turned out some of the largest steel and gray iron castings made in the United States; has some of the largest machinery construction shops in the world; has turned out large Diesel engines, the largest gas engines; has the largest and best equipped plant for the manufacture of electric traveling cranes and hoists in the United States.

Added to this we find large plants for the manufacture of mine hoists, cars, gears and controls, refrigeration machinery, enameling, boat motors, lumber, motorcycles, leather and shoes, food products and beer.

There is nothing more pleasing to Milwaukee visitors than the beautiful

Lincoln Memorial Drive which follows the shore line of Lake Michigan for a course of 6 miles through a series of parks and beaches, the Milwaukee Yacht Club, the Coast-guard Station, Milwaukee Gun Club and terminating in the wooded and ravined Lake Park.

The Milwaukee Yacht Club, nestling in a cove of the harbor, adds a picturesqueness to the lake front with its sailing vessels, motor boats and races and water sports.

Washington Park, on the far west side of the city, contains the zoo, one of the country's largest, and the only one which has successfully bred and raised polar bears. Mitchell Park on the south side is famous for its gorgeous conservatory and exquisite sunken gardens.

Another show place in Milwaukee is its fine museum and public library, housed under one roof in a handsome building near the Court of Honor. The museum is noted particularly for its early American characterizations, and its collection of Indian articles. The Layton Art Gallery and the Milwaukee Art Institute located at North Jefferson and East Mason Streets have very fine permanent collections.

As an educational center Milwaukee is proud of its schools and colleges. Marquette University welcomes students from all over the world. In addition to its graduate school and high school, special courses in liberal arts, journalism, business administration, law, dentistry, engineering, medicine, and music may be followed.

The Vocational School is one of the foremost of its type in the world. It enrolls 35,000 persons and has a faculty of 269. There are 70 different courses for boys and men and 35 for girls.

Then there is Milwaukee Downer College, an accredited women's college, offering degrees of B.A., B.Sc., and special courses for women, as well as the Extension Department of the University of Wisconsin providing instruction for 3,500 students.

Occupying an entire block in the downtown area is the new 10 million dollar Court House as an example of modernity. It is one of the buildings of a proposed civic center.

Make your plans now to be present at the Milwaukee convention—October 7 to 10. You will enjoy the inspiration that always comes from an annual reunion, and the splendid impulses that arise from attending sessions. The Local Committee is busying itself planning a meeting which will be a worthy addition to your store of memories.

And, today, this great metropolis invites you as did the friendly braves of the Ouisconsin village of long ago to sit by her council fires and smoke the pipe of peace—to enjoy the hospitality of this friendly city. You cannot fail to enjoy this land of beautiful scenery and pleasant climate that also is so rich in legendary and historic interest.

The Royal Institute of Hygiene

THE Executive Secretary of the American Public Health Association has been authorized to appoint a member or Fellow of the Association as a representative at the Royal Institute of Hygiene in England, June 4 to 9. Dr. Atwater will appreciate it if anyone who expects to be in England at this time will get in touch with him at the Association office, 50 West 50th Street, New York, N. Y.

ASSOCIATION NEWS

Organizations Meeting with the A.P.H.A. in Milwaukee

The following organizations will meet simultaneously with the American Public Health Association in Milwaukee, October 7–10.

American Association of School Physicians
International Association of Dairy and Milk Inspectors
Conference of State Sanitary Engineers
International Society of Medical Officers of Health
Association of Dairy, Food and Drug Officials
Conference of Wisconsin Health Officers
Conference of State Laboratory Directors
Association of Women in Public Health

The preliminary program plans include special sessions on The Rôle of a Health Department in a Program of Social Security, Mental Hygiene, Professional Education, Veterinary Public Health, Diphtheria Immunization, and a session upon the history and achievements of the Association's Committee on Administrative Practice, celebrating its 15th anniversary.

The Fourth Health Education Institute will be held October 4, 5, and 6, prior to the opening of the several conventions. The subject will be "Health Education in Small Cities and Rural Communities."

Vital Statistics Council Meets

A MEETING of the Council of the Vital Statistics Section was held February 3, in New York, with the following members present: G. E. Harmon, M.D., *Chairman*, Jessamine Whitney, George H. Van Buren, T. F. Murphy, M.D., John O. Spain, John Collinson, M.D., and A. W. Hedrich, Sc.D., *Secretary*. The following business was transacted:

The Committee on Confidential Inquiry on Causes of Death was continued. Dr. G. E. Harmon is to be chairman and Marjorie Bellows, who, with Dr. Matthias Nicoll has been conducting a survey on this subject in Westchester County, was appointed Secretary. For the next report of the committee, the following subjects have been suggested: (1) relative value of various methods of confidential inquiry; (2) change in death rates effected through confidential inquiry under titles other than the two discussed in the first report; (3) ways and means of extending confidential inquiry to other areas.

Discussion of the future of the Committee on Accident Statistics was deferred until the annual meeting.

A Committee on Standard Tables was authorized with Dr. John Collinson as chairman.

The Committee on Forms and Methods of Statistical Practice was authorized to take steps looking toward a joint committee with the Epidemiology Section for investigating the desirability and feasibility of differentiating, in certain reports, between varieties of the same disease; for example, major and minor smallpox.

It was voted to revise the "Rules for Statistical Practice" adopted in past years by the Section. Dr. T. F. Murphy was appointed committee chairman, with power to add.

It was voted to promote coördination between committees of the Section and those of the Association of State Registration Executives, by giving representation on Section committees to the chairmen or other suitable members of the Registrars' committees. As an ad-

ditional help in coördinating activities and promoting friendly relations it was voted to invite the president of the Registrars, Dr. Stewart Thompson, to become an Advisory Member of the Council of the Vital Statistics Section.

It was voted not to approve the resolution adopted by the Arizona Public Health Association calling for allocation of tuberculosis deaths to the place of origin of the disease, that objective, however desirable, being impracticable as routine procedure. It was felt that such allocation should be a matter of local study. Allocation to place of usual residence is, however, to be commended.

A resolution was adopted favoring a 1935 federal census (see editorial section). The Council also expressed its interest in the problem of promoting accuracy of intercensal estimates of populations for rural and the smaller intra-state areas, but no specific action was taken at this time.

It was voted to conduct a membership campaign, to have the following phases: (a) each member of the Council to bring in 5 new members; (b) section members, who travel extensively, to be requested to invite new memberships as occasion permits; (c) professional groups to be covered by members as follows: State registrars, Dr. Stewart Thompson; City registrars, Dr. G. E. Harmon; Insurance workers, George H. Van Buren; Health associations, Jessamine Whitney; Universities and foundations, Dr. A. W. Hedrich.

George H. Van Buren was appointed chairman of the Committee on Membership.

It was agreed, subject to approval of the Central Office, to prepare and circulate a directory of persons engaged in the collection, publication, or analysis of vital statistics. The directory, it is hoped will prove useful for program and and committee appointments, as an incentive to membership, and as a source of information as to who is who in vital statistics.

An outline of Annual Meeting sessions was tentatively adopted. There is to be a session for (a) committee reports and Section business, (b) registration problems, (c) needs of the various types of consumers of vital statistics, and (d) general papers.

It was voted to invite the Association of State Registration Executives to organize the session on registration problems, and to invite their President to chair the meeting jointly with the Section Chairman.

Votes of thanks were extended to Dr. W. J. V. Deacon for suggestions offered for the program, and to Dr. Dublin for the use of a meeting room.

A. W. HEDRICH, Sc.D., *Secretary*

APPLICANTS FOR MEMBERSHIP

The following individuals have applied for membership in the Association. They have requested affiliation with the sections indicated.

Health Officers Section

Joseph T. Brennan, M.D., Court House, Independence, Mo., Jackson County Health Commissioner

W. M. Brien, M.D., 449 Main St., Orange, N. J., Health Officer

Wheeler Davis, M.D., Kennett, Mo., Dunklin County Health Officer

Alfred D. Gregg, M.D., Asheboro, N. C., County Health Officer

Charles A. Harris, M.D., City Hall, London, Ont., Canada, Medical Officer of Health

Jerome M. Jekel, M.D., 1800 E. Capitol Drive, Milwaukee, Wis., Health Commissioner of Shorewood

Morton L. Levin, M.D., Dr.P.H., Court House, Grand Haven, Mich., Ottawa County Health Officer

Zack P. Mitchell, M.D., Henderson, N. C., County Health Officer

William J. Owings, M.D., Vernon, Ala., Lamar County Health Officer

Dr. H. H. Pansing, 2603 Salem Ave., Dayton, O., Montgomery County Health Commissioner

Arnold L. Peterson, 116 Temple St., Los Angeles, Calif., Executive Assistant to Health Officer

Andrew J. Signorelli, M.D., City Hall, Clayton, Mo., Health Commissioner

F. Michael Smith, M.D., Vicksburg, Miss., County Health Officer

Laboratory Section

Joseph W. E. Harrisson, 214 S. 12 St., Philadelphia, Pa., Lecturer, Philadelphia College of Pharmacy and Science; Consulting Chemist

Nell Hirschberg, M.A., 2900 Ellis Ave., Chicago, Ill., Assistant in Bacteriology, Michael Reese Hospital

Vital Statistics Section

Paul B. Cornely, M.D., Dr.P.H., Howard University, Washington, D. C., Assistant Professor in Public Health

Richard J. Learson, B.A., 4th & Broadway, Cincinnati, O., Associate Actuary, Western & Southern Life Insurance Company

Chettikulam N. Nayagam, 615 N. Wolfe St., Baltimore, Md., Student, Biostatistics Dept., Johns Hopkins School of Hygiene

Samuel A. Stouffer, Ph.D., University of Wisconsin, Madison, Wis., Professor of Social Statistics

William R. Tracey, B.A., Dominion Bureau of Statistics, Ottawa, Ont., Canada, Acting Chief, Vital Statistics Branch

Food and Nutrition Section

Bion R. East, D.D.S., National Oil Products Co., Harrison, N. J., Technical Consultant

James M. Frayer, B.S., Vermont Agricultural Experiment Station, Burlington, Vt., Dairy Bacteriologist

Walter H. Grunge, 622 W. 141 St., New York, N. Y., Inspector of Foods, Dept. of Health

Child Hygiene Section

Frances Johnson, M.D., 425 E. Wisconsin Ave., Milwaukee, Wis., Child Welfare Physician, Health Department

Frances M. Johnson, M.D., 719 Marion National Bank Bldg., Marion, Ind., Physician, Public Schools

Benjamin Lieberman, M.D., 2635 W. North Ave., Milwaukee, Wis., Child Welfare Physician, Health Department

Public Health Education Section

Charles St. J. Butler, M.D., U. S. Naval Hospital, Brooklyn, N. Y., Commanding Officer

Q. Edward Gatlin, B.A., P. O. Box 770, Jackson, Miss., Secretary, Committee on Postgraduate Medical Education, Mississippi State Medical Assn.

Public Health Nursing Section

Helen S. Ebbert, 505 Fulton St., Bay City, Mich., Public Health Nurse

Kathryn W. McCabe, R.N., 1219 N. 6 St., Boise, Idaho, State Supervising Nurse, E.R.A. Nursing Project

Ida M. Rainwater, U. S. Trachoma Hospital, Rolla, Mo., State Field Nurse

Opal Smith, R.N., St. John's Hospital, Jackson, Wyo.

Epidemiology Section

Esmond R. Long, M.D., Ph.D., Henry Phipps Institute, 7th & Lombard Sts., Philadelphia, Pa., Director of Laboratory

Unaffiliated

Marguerite M. Roe, R.N., 1732 Sheridan Ave., Whiting, Ind., County Medical Investigator

William M. Wade, P. O. Box 186, Westfield, Mass., Engineer, Westfield State Sanatorium

DECEASED MEMBERS

A. Brioso Vasconcelos, M.D., Mexico, Mex., Elected Member 1921, Fellow 1923

Lemar W. Andrews, M.D., Warsaw, N. Y., Elected Member 1919

M. Frances Etchberger, Baltimore, Md., Elected Member 1931

Harry F. Ferguson, Springfield, Ill., Elected Member 1916

John C. Humphreys, M.D., Philadelphia, Pa., Elected Member 1926

John Le Feber, Milwaukee, Wis., Elected Member 1913

Anna M. Scholfield, Providence, R. I., Elected Member 1932

Charles Strauss, New York, N. Y., Elected Member 1914

William H. Wakelee, Southbury, Conn., Elected Member 1933

DR. KENDALL EMERSON AND DR. JESUS E. MONJARAS ELECTED TO HONORARY FELLOWSHIP IN THE ASSOCIATION

ACTING on the recommendation of the Executive Board, the Governing Council has unanimously elected to Honorary Fellowship Dr. Kendall Emerson, past Executive Secretary of the Association, and Dr. Jesus E. Monjaras of Mexico City.

NEWS FROM THE FIELD

MENTAL DEFICIENCY

THE Annual Meeting of the American Association on Mental Deficiency will be held at the Hotel Palmer, Chicago, on April 25, 26, and 27. The sessions on the 25th and 26th will be devoted to studies on Mongolism; Birth Injury as an Etiological Factor in Mental Deficiency; Mental Disorders in Mental Deficiency; The Problem of Sterilization; Defective Delinquency and Its Relation to Penal Institutions; Community Supervision of the Paroled Mental Defective; and Newer Methods in Institutional Training for Community Life. The session on April 27, will be devoted to the sociological, psychological, and the special education aspects of Mental Deficiency. Complete data on the program may be obtained from the Secretary, Dr. Groves B. Smith, Godfrey, Ill.

INDIAN MEDICAL SERVICE

ONE feature of the new policy of the Indian Medical Service is to conduct Institutes as refresher courses for physicians and nurses. The first undertaking in this direction is scheduled for the Navajo Area physicians and nurses March 4 to 15. Two groups of physicians and two groups of nurses will sit at the feet of Dr. Walter Clarke of the American Social Hygiene Association in an Institute on Syphilis. This arrangement will afford all of our 20 physicians and most of our 62 nurses an opportunity to refresh themselves on the best accepted scientific practices relating to the diagnoses, treatment, and control of syphilis. With tuberculosis and trachoma, syphilis completes our triumvirate of scourges draining Indian health.

Another bit of news is the formation of an Indian Medical Society in the States of Arizona and New Mexico. The nucleus around which this organization was built was our Navajo physicians, but since there are Reservations in other parts of these two states, our Washington Office has proposed the formation of two additional branches; one for Arizona and one for New Mexico. It so happens that the membership will be 18 or 19 for each group.

These past months have been particularly hard ones for the Indian people in the Navajo Reservation because of the unusual incidence of influenza, measles, chicken pox, mumps, and pneumonia following measles or influenza. Our physicians and nurses have also been handicapped by an unusual precipitation in the form of snow and rain, making the roads almost impassable.—Excerpt from letter from W. W. Peter, M.D., Dr.P.H., F.A.P.H.A., Medical Director Navajo Area, Albuquerque, N. M., Feb. 26, 1935.

MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH

AT the Annual Meeting of the Massachusetts Association of Boards of Health, held in Boston on January 31, 1935, the following officers were elected: *President,* Paul R. Withington, M.D., Milton; *First Vice-President,* Ernest M. Morris, M.D., Fall River; *Second Vice-President,* Curtis M. Hilliard, Wellesley; *Secretary-Treasurer,* G. Donald Buckner, Needham. Dr. Charles F. Wilinsky was appointed to represent the association on the Governing Council of the A.P.H.A.

The first two sections to be estab-

lished in the association are the Board of Health and the Laboratory Sections. These held their first meeting preceding the Annual Meeting, and elected the following officers for 1935: Board of Health Section—*Chairman,* Francis G. Curtis, M.D., Newton; *Secretary,* William O. Hewitt, M.D., Attleboro; Representative to Executive Committee, John J. McGrath, Salem; Laboratory Section — *Chairman,* Frank E. Mott, B.S., LL.B., Boston; *Secretary,* Roy F. Feemster, M.D., Boston; representative to the Executive Committee, Herbert E. Bowman, North Acton.

HADASSAH LAUNCHES RESEARCH PROGRAM

IN addition to curative and preventive work Hadassah will soon enter the realm of medical research and teaching. Through the proposed Rothschild-Hadassah-University Hospital in Jerusalem, which will be build by Hadassah and the American Jewish Physicians' Committee, large-scale research will be carried on in a number of diseases, including cancer. The new medical center will include a graduate school of medicine to be affiliated with the Hebrew University. The heads of the hospital research and teaching departments will include eminent scientists exiled from Germany.

SOUTHERN CALIFORNIA PUBLIC HEALTH ASSOCIATION

AT the Annual Meeting of the Southern California Public Health Association, held at Santa Barbara, Calif., on January 26, 1935, the following officers were elected:

President—Dr. E. B. Godfrey, San Bernardino

President-Elect—Dr. R. V. Stone, Los Angeles

First Vice-President—Dr. R. C. Main, Santa Barbara

Second Vice-President—Dr. W. F. Foxe

Secretary-Treasurer—T. P. B. Jones, Riverside

VENEREAL DISEASE ESSAY CONTEST

THE council of the British Medical Society for the Study of Venereal Diseases announces a prize of £18 to be awarded the best critical review dealing with any venereal disease considered from any angle. The essay selected for the prize will become the property of the council, and the council will be at liberty to publish in the *British Journal of Venereal Diseases* any paper other than the one receiving the award.

Contributions should be about 6,000 words, typed, and sent to the Secretary of the Society, 43 Queen Anne Street, London, W.1, before July 31, 1935.

ALABAMA COUNTY HEALTH DEPARTMENT DISCONTINUED

THE Geneva County Health Department has been discontinued in accordance with a decision of the Alabama Board of Commissioners. Dr. Lucius S. Nichols was the County Health Officer.

HEALTH UNIT OF THREE COUNTIES

A THREE-COUNTY health unit, which includes El Paso, Hudspeth, and Culbertson Counties, has been established under the supervision of Dr. Thomas J. McCamant, member A.P.H.A., Director of the City-County Health Unit of El Paso.

SUMMER ROUND-UP BEGINS

THE 11th annual Summer Round-Up of the Children, major child health project of the National Congress of Parents and Teachers, will soon be in full swing. Although May 1, National Child Health Day, is the official opening date of the nationwide campaign, parent-teacher associations already are busy with the preliminary work of securing the names of preschool children and preparing for the campaign. The object of the Summer Round-Up is to send to the entering grade of school a class of children as free as possible from remediable physical defects.

PERSONALS

KENDALL EMERSON, M.D., F.A.P.H.A., Director of the National Tuberculosis Association, spoke at the Second National Conference on Slum Clearance and Rehousing, in Washington, January 18, on the public health aspects of a national rehousing program. He stated that the spread of tuberculosis had been checked by public education, but the death rates in slum areas still equal the high mortality of the nation as a whole a generation ago.

LEONARD GREENBURG, M.D., Fellow A.P.H.A., Acting Health Officer of New Haven, has been placed in full charge of the Department of Health of New Haven. He succeeds Dr. John L. Rice, who left New Haven to become Health Officer of New York City.

WILSON CARTER WILLIAMS, M.D., member A.P.H.A., has been appointed State Health Officer of Tennessee. He has been a member of the Department staff since 1926, and succeeds Eugene L. Bishop, M.D., Life Member and President of the A.P.H.A., who resigned to become full time Health Officer of the Tennessee Valley Authority.

HENRY R. O'BRIEN, M.D., F.A.P.H.A., has been provisionally appointed Commissioner of Health in Cattaraugus County, N. Y., to fill the vacancy caused by the resignation of Reginald M. Atwater, M.D., who has become the Executive Secretary of the A.P.H.A. Dr. O'Brien was graduated from the University of Michigan and has spent some years in the Orient with the Rockefeller Foundation. He holds a Certificate in Public Health from Johns Hopkins, has been a County Commissioner of Health in Ohio, and for the last 6 months has been on the staff of the New York State Department of Health, Albany.

THOMAS J. LEBLANC, Sc.D., member A.P.H.A., has been advanced from Associate Professor of Preventive Medicine in charge of a new department of preventive medicine at the University of Cincinnati College of Medicine.

ROSWELL H. JOHNSON, M.S., formerly of the University of Pittsburgh, has been appointed social hygienist in the Palama Settlement, Honolulu, and part time professor in the University of Hawaii. He will give courses in social hygiene and eugenics.

JOSE FABELLA, M.D., member A.P.H.A., of Manila, has been appointed Commissioner of Health and Welfare of the Philippine Islands.

GEORGE C. RUHLAND, M.D., F.A.P.H.A., Commissioner of Health of the City of Syracuse, N. Y., since 1928, has accepted the office of Health Commissioner of the District of Columbia, to succeed William C. Fowler, M.D., member A.P.H.A., who has retired. Dr. Ruhland entered the field of public health in 1905. He became bacteriologist and then director of laboratories in Milwaukee Health Department, which position he held for 8 years. In 1914 he was appointed Commissioner of Health of Milwaukee, in which position he served until 1924, when he became Director of the Syracuse Health Demonstration on the staff of the City Department of Health. He was made Commissioner in 1928.

E. S. MACPHAIL, F.A.P.H.A., after more than 33 years' association with the statistical service of Canada, has retired as Chief of the Demography Division of the Dominion Bureau of Statistics. He entered the Canadian Civil Service in 1901 as Chief Clerk in the Fourth Census, became Superintendent of Compilation of the 1911 Census, and in that capacity introduced mechanical tabulation into the Census Office. In 1918 he took a

leading part in the organization of the registration system for births, marriages, and deaths in Canada. In the same year, the Dominion Bureau of Statistics was formed, and Mr. MacPhail was appointed Chief of the Demography Division, which embraced the census and, since 1920, the compiling of vital statistics. Mr. MacPhail has been a member of the Council of the Vital Statistics Section of the A.P.H.A. since 1930. Articles by him were published in the *Journal* on the subject of infant mortality in May, 1927; on accident classification in January, 1929; and on maternal mortality in June, 1932. He has also contributed extensively to Canadian journals. W. R. Tracey has, since Mr. MacPhail's retirement, been appointed Acting Chief of the Vital Statistics Office. A. W. H.

CHESTER S. BOWERS, B.S., member A.P.H.A., recently resigned as Director of the Health Laboratory of New Britain, Conn., to accept the position of Senior Microbiologist in the Bureau of Laboratories of the Connecticut State Department of Health, Hartford, Conn.

CHARLES M. PEARCE, M.D., member A.P.H.A., of McAlester, was appointed State Health Commissioner of Oklahoma on February 8.

PEARL L. KENDRICK, Sc.D., F.A.P.H.A., Bacteriologist of the Michigan Department of Health, recently received a grant for research in antigenic properties of bacillus pertussis from the National Research Council.

DR. MILTON R. KUKUK, of Toledo, O., has been appointed Health Commissioner of Lucas County, to succeed the late Dr. Fred F. Devore.

JAMES S. HOUGH, M.D., F.A.P.H.A., of Livingston, Ala., Health Officer of Sumter County, has been named District Medical Superintendent in charge of eleven counties.

DR. HENRY T. DONOVAN, of Marion, Ala., has been appointed Health Officer of Shelby County, succeeding Dr. John M. Kimmey, of Columbiana.

DR. CECIL KENT DRINKER has been appointed Dean of the Harvard School of Public Health, effective September, 1935, to succeed Dean Dr. Edsall. He is at present Professor of Physiology and Acting Dean.

DEATHS

JOHN RUHRAH, M.D., prominent pediatrician, author and lecturer of Baltimore, Md., died March 10. He was president of the American Pediatric Society, 1925; of the Medical Library Association, 1927; of the Maryland Medical and Chirurgical Faculty, 1919; of the American Academy of Pediatrics, 1934; and of the Osler Historical Society since 1933. In addition to medical history, he specialized in nutrition, clinical pediatrics, poliomyelitis, and dietetics, and wrote many books.

DR. JABEZ NORTH JACKSON, City Health Director of Kansas City, Mo., since 1932, died March 18. In the Spanish-American War Dr. Jackson was chief of the Second Division Hospital, Second United States Army Corps, near Harrisburg, Pa. He was president of the American Medical Association in 1926.

DR. LUTHER C. PAYNE, Health Officer for 20 years of Liberty, N. Y., died March 16. He was Liberty's second health officer in 50 years.

DR. F. F. DEVORE, District Health Commissioner of Lucas County, Toledo, O., died recently.

CONFERENCES

March 31–April 7, National Negro Health Week—21st Annual Observance.

April 3–5, Municipal Training Institute of New York State: Municipal

Training School for City and Village Sewage Works Operators and Sewer Superintendents of New York State; State Office Building, Albany, N. Y.

April 4, 5, Ohio-Michigan-Indiana-Ontario-New York-Pennsylvania Sectional Meeting of the American College of Surgeons, Cleveland, O.

April 10–11, Montana Section of American Water Works Association, Helena, Mont.

April 11–12, Four States Section Meeting of American Water Works Association, Atlantic City, N. J.

April 24–27, National Convention, American Physical Education and its Eastern District Society, Pittsburgh, Pa.

April 25–27, Annual Meeting of the American Association on Mental Deficiency, Chicago, Ill.

April 29–May 3, 39th Annual Convention, National Congress of Parents and Teachers, Miami, Fla.

April 29, 19th Annual Meeting of the New York State Association of Public Health Laboratories, Syracuse Memorial Hospital, Syracuse, N. Y.

April 29–May 3, 19th Annual Clinical Session of the American College of Physicians, Philadelphia, Pa.

May 12, Mothers Day.

May 6–10, Annual Convention of American Water Works Association, Cincinnati, Ohio.

May 14, 15, 19th Annual Meeting of the Central Atlantic States Association of Dairy, Food and Drug Officials, Richmond, Va.

May 20–22, Tenth Annual Meeting of the American Association for Adult Education (66 East 42 Street, New York), Milwaukee, Wis.

May 24–25, Spring Meeting of New York State Sewage Works Association, Poughkeepsie, N. Y.

June 3–5, Twenty-Fourth Annual Meeting, Canadian Public Health Association, in conjunction with the Ontario Health Officers' Association, Canadian Tuberculosis Association, and Canadian Social Hygiene Council. Royal York Hotel, Toronto.

June 4–9, Annual Meeting, Royal Institute of Health, Harrogate, England.

June 9–15, National Conference of Social Work, Montreal, Que., Canada.

June 10–14, Annual Meeting of the American Medical Association, Atlantic City, N. J.

June 17–19, Ninth Annual Iowa Conference on Child Development and Parent Education, Iowa City, Iowa.

June 19–22, Eighth Health Education Conference of the American Child Health Association, Iowa City, Iowa.

June 24–27, Annual Meeting of the National Tuberculosis Association, Saranac Lake, N. Y.

June 24–29, Summer Meeting of the American Association for the Advancement of Science and Associated Societies, Minneapolis, Minn.

July 1–3, Sixth Annual Meeting, Western Branch American Public Health Association, Helena, Mont.

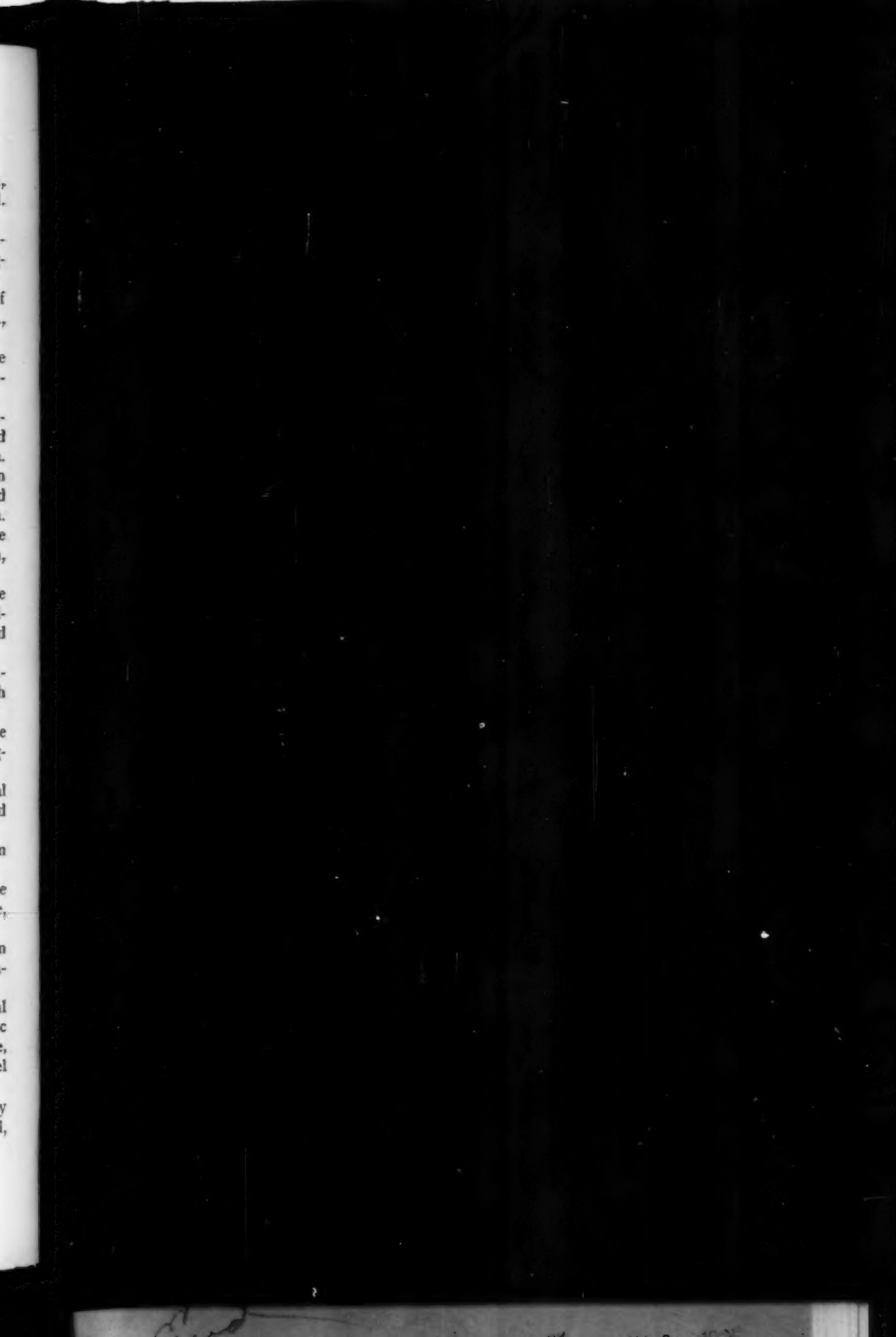
July 15–20, Royal Sanitary Institute Health Congress, Bournemouth, England.

July 22–27, Seventh International Congress on Industrial Accidents and Diseases, Brussels, Belgium.

July 23–27, International Congress on Life Assurance Medicine, London.

July 31–Aug. 3, Annual Meeting of the American Dental Society of Europe, London.

Aug. 10–17, Meeting of Health Section of the World Federation of Education Associations, Oxford, England.

October 7–10, Sixty-fourth Annual Meeting of the American Public Health Association, Milwaukee, Wis. Headquarters: Hotel Schroeder.

October 14–18, 24th Annual Safety Congress, National Safety Council, Inc., Louisville, Ky.